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VOLUME 248 JANUARY 22, 1953 NUMBER 4

Short-Term Continuous Transperitoneal Dialysis 125
Marcel Legrain and John P. Merrill

Transduodenal Sphincterotomy for Chronic Relapsing Pancreatitis 130
James W. Major and Edward Ottenheimer

Current Judgments on Metabolic Control and Complications in Diabetes 133
Frederick M. Allen

Urinary-Tract Infections In Diabetic Women . 136
Donald M. Barnard, Robert D. Story and Howard F. Root

Medical Progress: General Practice, Today and Tomorrow (To be concluded) 141
Joseph S. Collings and Donald M. Clark

Massachusetts Department of Public Health . 162

Notices 164

Medical Intelligence:
Urticaria Due To Drugs of the Digitalis Series 148
Leroy S. Wolfe and Arthur J. Geiger

The Necessity for Adding Albumin to Serum in Crossmatching 149
Morten Grove-Rasmussen and Lamar Soutter

Case Records of the Massachusetts General Hospital 151

Editorials:
Report on General Practice 159
Education in Health 160
Sphincterotomy for Chronic Relapsing Pancreatitis? . 161
Hunterian Society Debates 162

Books Received 163

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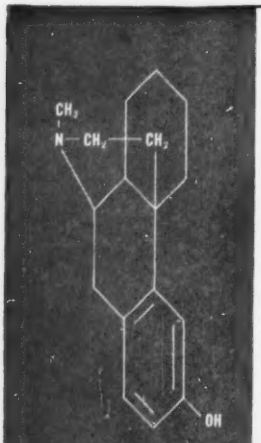

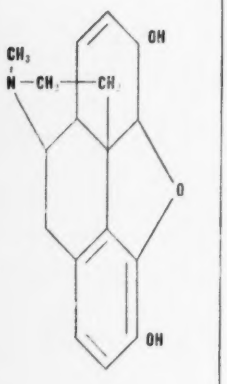

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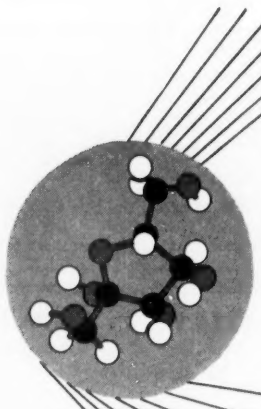

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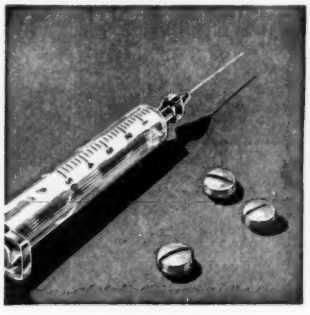

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Volume 248 JANUARY 22, 1953 Number 4

SHORT-TERM CONTINUOUS TRANSPERITONEAL DIALYSIS*

A Simplified Technic

MARCEL LEGRAIN, M.D.,† AND JOHN P. MERRILL, M.D.‡

BOSTON

SINCE the initial report of Fine, Frank and Seligman,[1,2] various workers have studied the technic of peritoneal irrigation, both in the laboratory and at the clinical level.[3-6] In addition to its utilization as a procedure for experimental electrolyte depletion,[7] it has been employed in the treatment of acute renal insufficiency and chronic edema. The present report deals with the technic for peritoneal irrigation first employed in 1946 by Tanret[8] and Dérot[9] in Paris. The French experience since that time comprises over 100 clinical procedures.[9-12] Our observations are based on the experience of one of us in the employment of this technic in the department of Dr. Dérot, and on a series of 5 dialyses in 3 patients studied by both of us at the Peter Bent Brigham Hospital. This experience has led us to believe that the procedure may be of value as an adjunct to the conservative management of acute renal failure, particularly when such management has failed to control progressive hyperkaliemia. It has the distinct advantage of employing only materials that are easily available in a community hospital; also, the basic technic is one with which all physicians are familiar. As such, it should be a feasible undertaking in most community hospitals. For this reason, the technic itself is described in more than the usual detail.

MATERIAL

The basic principle of the procedure is that of continuous irrigation of the peritoneal cavity. This is carried out, however, for a short time, usually less than fifteen hours. The materials required are cheap and simple and can be prepared in the central supply room of any hospital where major surgical procedures are performed. They consist of flasks containing the irrigating fluid for intravenous administration (these are best made up in 15 bottles containing 2 liters each); an ordinary intravenous-infusion set; a routine paracentesis set containing a trocar with two stylets, of which one should be sharp, preferably 15 to 20 cm. in length, with an outside diameter of 2.5 mm., and the other stylet blunt (for this the ordinary perforated hollow stylet in the routine paracentesis set may be employed); and two plastic catheters, 30 cm. in length, with an external diameter that will permit them to be inserted through the trocar. The wall of the catheter must be stiff enough to permit insertion and some manipulation without kinking. Eight to ten small, smooth holes should be made in the distal part of the catheter. In our experience, catheters of polyvinyl chloride, which can be autoclaved, are to be preferred. These may be hardened to the desired stiffness by immersion in mineral oil that has been heated almost to the boiling point (350°F.). Two plastic or metal adapters§ serve to connect the plastic catheters with the intravenous-infusion apparatus. These materials can be made up in small kits and autoclaved, to be available when needed.

Composition of the Irrigating Fluid

The composition of the fluid to be used depends upon the purpose of the dialysis.

Acute renal insufficiency. The most suitable solution has been found to be similar to solution A of Abbott and Shea[13] except that phosphate is omitted, since in acute renal failure phosphate is one of the substances to be removed. Table 1 gives the composition of this fluid. In cases in which hyperkaliemia is the prime indication for treatment, potassium is omitted entirely from the dialyzing solution. Potassium can be added as a concentrate to the previously autoclaved flask of irrigating fluid or omitted as desired. Just prior to utilization of the fluid, sodium bicarbonate is added from sterile ampoules in the amounts indicated.

An axiom for the composition of such solutions is that they must be hypertonic to the plasma of the patient being treated, to avoid absorption of water. The solution used by us has a total osmo-

*From the Medical Service, Peter Bent Brigham Hospital, and the Department of Medicine, Harvard Medical School.

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larity of about 390 millimols per liter, which has been adequate for a majority of the uremic patients. For patients whose plasma osmolarity exceeds this, the concentration of the irrigating fluid can be further increased by the addition of more glucose. Colloid osmotic agents have not been employed because of cost and difficulty with viscosity and preparation.

Table 1. *Composition of Irrigating Fluid for Use in Renal Failure.**

Compound	Amount gm. / liter	Compound	Amount milliequiv. / liter
NaCl	6.1	Na	130.0
$NaHCO_3$	2.2	K	4.6
KCl	0.35	Ca	4.2
$CaCl_2$ (anhydrous)†	0.23	Mg	1.1
$MgCl_2$ (anhydrous)	0.05	Cl	115.0
Glucose	20.0	HCO_3	26.0

*Total osmolarity, 390 millimols per liter.

†May be added in half the amount, since it is probably necessary only to equilibrate Ca++ in the fluid with ionized calcium in the plasma.

Chronic edema. By a decrease in the sodium content of the irrigating fluid and by an increase of the tonicity with glucose, it should be possible to effect transfers of sodium by irrigation. The work of Benhamou et al.,[14-16] Dérot and his associates[17] and others[18, 19] suggests that this technic is feasible at the clinical level. The composition of the fluid utilized for this purpose is given in Table 2. Previous work has indicated that sodium and water depletion can be rapidly accomplished by this technic.[7] Our experience with the treatment of 1 such case in this hospital suggests that the sodium concentration of the perfusing fluid might well be somewhat higher and that of the glucose lower to temper the rate at which sodium and water are removed.

Table 2. *Composition of Irrigating Fluid for Use in Chronic Edema.**

Compound	Amount gm. / liter	Compound	Amount milliequiv. / liter
KCl	0.35	Na	27.0
$MgCl_2$ (anhydrous)	0.05	K	4.6
$CaCl_2$ (anhydrous)	0.23	Ca	4.2
$NaHCO_3$	2.20	Mg	1.1
NaH_2PO_4	0.07	Cl	10.0
Glucose	60.00	HCO_3	26.0
	80.00	H_2PO_4	1.0

*Total osmolarity, 405(515) millimols per liter.

To each liter of fluid, regardless of its composition, 100,000 units of penicillin, 50 mg. of streptomycin and 5 mg. of heparin should be added before dialysis. The antibiotic concentrations are somewhat higher than those employed by the majority of previous workers,[6] but no harmful effects have been observed, and we believe that they contribute greatly to the prevention of subsequent infection. Previous workers used metallic trocars, and it is our opinion that the use of a plastic catheter should permit reduction in the amount of heparin, and perhaps its elimination. In any event, with this amount of heparin, no bleeding related to the procedure has been observed even in patients with pre-existing defects in the clotting mechanism.

Technic

Before the procedure, a plain film of the abdomen should be taken to visualize bowel filled with gas or feces. The patient should be suitably prepared with sedatives, and an enema may be helpful in reducing distention. He should be flat on his back in as comfortable a position as possible, with head and shoulders supported by a pillow. The skin is carefully prepared as though for a laparotomy, and areas about the MacBurney point on the right and the corresponding point on the left are infiltrated with 1 or 2 per cent procaine. It is advisable to place the first catheter on the left side to avoid the possibility of injuring the relatively immobile cecum with the stylet. Since approximately 2 liters of fluid is allowed to distend the abdomen before insertion of the trocar on the right side, this risk is subsequently obviated. From an anatomic point of view, a paracentesis is best performed with the patient in the sitting position and the trocar inserted in the mid-line, halfway between the pubis and the umbilicus; at this point, one does not run the risk of traumatizing the epigastric vessels, which is a definite possibility with the lateral puncture. Such complications have not been a real source of difficulty, however, with the lateral sites, and because of the advantage of increasing the area of peritoneum exposed to irrigating fluid, we have employed this technic.

After suitable infiltration of the skin, a small incision may be made, and through this incision, with a sharp stylet in place, the trocar is inserted through the subcutaneous tissues. The aponeurosis of the external oblique muscle can be felt as the operator comes down upon it, and will be penetrated by a vigorous, sharp thrust. At this point in the procedure, the sharp stylet is replaced by the blunt one, and the remaining muscle and peritoneum can be entered with another sharp thrust. The plastic catheter is inserted through the trocar into the peritoneal cavity for a distance of 10 to 20 cm., and the metal trocar is then removed. The catheter is then connected to the intravenous set containing the bottle of irrigating fluid, which has previously been warmed to body temperature, the catheter fixed to the abdominal wall, and the paracentesis site draped with a sterile towel. The flow of the fluid into the peritoneal cavity through the initial catheter is then regulated at about 2 liters per hour, and forty-five minutes later, when the abdominal-wall distention is apparent, the outflow catheter is inserted on the right side in a similar position and with the same technic. The plastic catheter, once

inserted for outflow, is connected with another tube, which leads to a collecting flask placed beneath the patient's bed. It is essential initially that the rate of inflow be regulated to that of the outflow to avoid excessive abdominal distention. Optimally, a constant volume of about 2 liters is maintained in the peritoneal cavity.

Regulation of Flow

If difficulty is encountered in obtaining adequate outflow, the inflow should be decreased or even stopped until this defect can be remedied. Dérot and his-co-workers, studying the relation between flow through the peritoneal cavity and extraction ratio of substances from the blood, have concluded that optimum results are obtained with the flow of irrigating fluid maintained at about 2 or 3 liters per hour. An increase of flow in excess of 3 liters causes the extraction ratio to decrease markedly and accomplishes only the useless expenditure of excess quantities of irrigating fluid.

Duration

A number of workers with peritoneal irrigation have employed a continuous flow for several days. It is probable that many of the difficulties encountered have been related to the excessive time during which this procedure has been continuously employed. Our experience leads us to believe that prolonged irrigation is tiring and uncomfortable for the patient, and it is frequently accomplished by a decrease in flow after an interval of sixteen to eighteen hours. The most important consideration, however, is that the risk of infection is considerably intensified by the increasing duration of the procedure. That this risk is not necessarily related to failure to observe careful aseptic precautions has been demonstrated by Frank et al.,[20] who have shown that the organisms responsible for the infection during these procedures apparently have migrated through the intact intestinal wall. With a reduction in the duration of the dialysis, no infection has been encountered. The average duration is between twelve and fifteen hours with the technic described, and it appears adequate in most cases to obtain the therapeutic results desired. The irrigation may be repeated in forty-eight hours without harm. At the end of the procedure, both plastic catheters are used to remove fluid from the abdomen. A small amount of abdominal pressure helps remove some of the fluid, but between 1000 and 1500 cc. cannot be removed in this fashion, and this residue must be anticipated in estimations of the fluid requirements on the day of dialysis.

Difficulties and Complications

Occasionally, abdominal pain is encountered, beginning at about the eighth to the tenth hour of the procedure. Usually, this is not incapacitating. Severe abdominal pain may be encountered if excessive fluid is allowed to distend the peritoneum, particularly if this distention occurs suddenly. It may also follow errors in composition of the irrigating fluid, causing excessive hypotonicity or hypertonicity. Mild abdominal pain may persist for twenty-four hours after the procedure, but in the majority of cases this is not present.

With excessive distention, fluid may leak along the tract of the catheter insertion. This should usually be obviated by proper balance between inflow and outflow.

Edema of the subcutaneous structures may be encountered if the catheter is not inserted far enough into the peritoneal cavity so that all the distal stomas in the tube are inside the peritoneum. A little experience will usually overcome any difficulties in initiating and maintaining proper flow. Change in position of the catheter, increasing the amount of fluid slightly or reversing the flow through inflow and outflow tubes will help to solve this problem.

Infection

Infection appears to be the most important complication encountered by the various workers in this field. Odel, Ferris and Power[6] report that 48 per cent of the 54 procedures reviewed were complicated by infection. In the series of patients studied in Paris and in this hospital, the risk of infection was extremely slight. In the French group only 3 of the 100 patients studied gave evidence of infection. The first of these was among the first patients treated. The dialysis in this case lasted for ten days. The other 2 cases were related to pre-existing infection — in 1 case salpingitis, and in the other, appendicitis. All 3 patients survived with antibiotic therapy. It has been customary to give 1,000,000 units of penicillin per day for the three days before and after the procedure.

Perforation

In the French series, perforation of the bowel occurred in 1 case; the trocar was inserted initially on the right side and entered the lumen of the cecum, but the perforation was repaired and dialysis continued without further difficulty. No perforations have been encountered since the custom of placing the trocar initially on the left has been instituted.

Hemorrhage

It is possible, as in routine paracentesis, that small arteries will be torn by the insertion of the trocar. In the series studied in Paris, a small, persistent hemorrhage from trauma to a small artery caused the procedure to be interrupted in only 1 case.

Edema

With careful regulation of the inflow and realization that 1000 to 1500 cc. will remain, no edema has been encountered in the patients treated to date.

Abdominal Distention

In a few cases, moderate abdominal distention has followed the procedure, persisting for twenty-four to forty-eight hours. This has disappeared spontaneously or after treatment by small enema or prostigmine.

Cardiovascular Effects

The pulse and blood pressure should be watched during the procedure. In 50 per cent of the cases, no essential change has occurred in heart rate or blood pressure. In the others, a mild hypertension has been noted, with a rise in both systolic and diastolic pressure during the procedure that returned to predialysis levels after cessation of dialysis. This phenomenon has been noted during dialysis with the Kolff type of artificial kidney.[22] Its cause is obscure.

Contraindications

The contraindications to the procedure here described are much the same as those listed for the other forms of peritoneal irrigation. They include recent laparotomy, with the exception of appendectomy, after which dialysis has been carried out once within five days without difficulty. It is wise to avoid the scar of old operative incisions when the trocar is being inserted. Infection of the peritoneal cavity is an obvious contraindication. In cases of superficial infection of the abdominal wall, the risk of introducing organisms into the peritoneal cavity must be carefully considered and proper precautions taken.

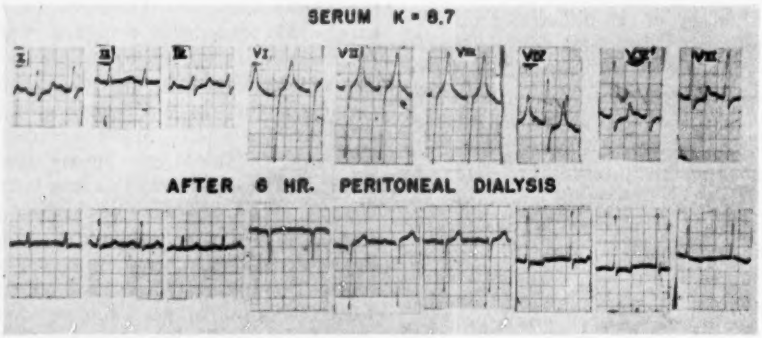

Figure 1. *Electrocardiographic Changes in Case 3 during Transperitoneal Dialysis.*

Indications

Acute Renal Insufficiency

The primary indication for intermittent peritoneal dialysis is acute renal insufficiency, and even then only as an adjunct to the best conservative methods of treatment. In cases of acute reversible renal insufficiency in which the clinical situation is deteriorating in spite of usually adequate conservative therapy, or in which, in spite of conservative measures, electrocardiograms show progressive potassium intoxication, the dialysis may prove a relatively simple and effective method of therapy. As with other procedures for the removal of retained metabolites in renal failure, it can be expected to be effective only when the morbid state is in large part due to the chemical imbalance. It has the advantage of simplicity, requires little apparatus and involves a basic technic with which most physicians have had some experience. Although its efficacy is less than that of the so-called artificial kidneys, the extraction of nitrogenous wastes is nevertheless significant. Dérot et al.[10, 12] report an average removal of 45 gm. of urea in fourteen hours in patients whose blood urea nitrogen was about 200 mg. per 100 cc. Reymond and his co-workers,[21] using the same technic, have been able to remove 110 gm. of urea in twelve hours. These figures derive their significance not from the therapeutic effect of urea removal alone, but because of the quantitative relation to the transfer and removal of other metabolites. The average extraction ratio of potassium, with a flow of 2 liters per hour, is about 30 per cent.

The procedure may be repeated if necessary within two days; it has been employed five times in the same patient over a period of two weeks without ill effects. It may also be employed in association with other types of extrarenal metabolite removal such as the artificial kidney, exchange transfusion and intestinal lavage.

Chronic Renal Insufficiency

Indications for peritoneal irrigation in chronic renal failure are rare. Occasionally, however, it may be a therapeutic adjunct after severe trauma, infection or operation.

Chronic Edema

As pointed out above, with suitably prepared solutions, it is possible to remove large amounts of

sodium chloride and water in clinical situations such as chronic congestive heart failure and the nephrotic syndrome.[14, 19] At present, transperitoneal dialysis used in this fashion is an interesting experimental method whose clinical significance is undetermined.

Case Reports

Five procedures have been undertaken in 3 patients at the Peter Bent Brigham Hospital. Brief extracts of these case reports follow.

Case 1. An 18-year-old boy with anuria subsequent to acute glomerulonephritis was transferred from another hospital because of generalized edema and marked evidence of pulmonary congestion. An electrocardiogram showed advanced changes of potassium intoxication. Peritoneal irrigation was undertaken with a hypertonic, potassium-free fluid in an attempt to correct both overhydration and potassium intoxication. A weight loss of 2.8 kg., of which 1200 cc. was ascitic fluid, was accomplished. The serum potassium dropped from 8.7 to 7 milliequiv. per liter, and there was marked improvement in the electrocardiogram and moderate improvement in the pulmonary congestion.

Case 2. A 33-year-old man was admitted to the hospital because of a nephrotic syndrome, which had been refractory to previous forms of therapy aimed at ameliorating marked generalized edema. A sodium-free irrigating fluid made hypertonic with glucose was used. An estimated 1000 milliequiv. of sodium and 900 milliequiv. of chloride were removed in 7 hours, with a marked drop in the serum levels of sodium and chloride. Although the efficacy of the technic was demonstrated by an average outflow concentration of sodium of 77 milliequiv. and of chloride of 55 milliequiv. per liter, the rate of desalting was obviously too rapid, and the disproportion between sodium and chloride losses on one hand and water on the other was unsatisfactory, since shortly after the procedure, acute muscular cramps developed, requiring administration of hypertonic saline solution.

Case 3. A 28-year-old woman was admitted to the hospital for the 2d time in congestive heart failure and pulmonary edema, having previously been treated for uremia secondary to chronic pyelonephritis. The congestive heart failure responded to digitalis and to fluid restriction, and hemodialysis with the artificial kidney was performed, with a good clinical response. On the 21st hospital day, a renal homograft was transplanted into the right thigh and anastomosed to the femoral vessels.[23] The operation required general anesthesia and lasted for 2½ hours. Four days later, there was electrocardiographic evidence of advanced potassium intoxication, which failed to respond to cation-exchange-resin therapy. Because of oozing from the operative site, it was decided that heparinization (necessary for hemodialysis with the artificial kidney) was contraindicated. Peritoneal irrigation by the technic described was undertaken for 8 hours. The electrocardiographic changes were reversed (Fig. 1), and there was marked improvement in the clinical status. Nine days later, because of persistent oliguria and further evidence of hyperkaliemia, peritoneal irrigation was again performed, and a 3d procedure carried out 6 days later. Each time, the irrigating fluid was constituted as in Table 1 except that potassium was absent. The duration of the 1st procedure was 10 hours, with an average flow of 1 liter per hour. The average concentration of potassium in the outflow fluid was 4.4 milliequiv. per liter, with a total of 50 milliequiv. of potassium removed during the 10-hour period. The average urea nitrogen concentration in the outflow fluid was 100 mg. per 100 cc. at a time when the patient's blood plasma urea nitrogen was 320 mg. per 100 cc. Although the glucose absorbed from the irrigating fluid may have contributed to improvement in the electrocardiogram, the measured potassium removal itself was therapeutically significant.

In this patient, there were no ill effects attributable to peritoneal irrigation itself after the 3 procedures during a 2-week period, although she eventually succumbed to the disease.

Summary and Conclusions

A simplified technic for the removal of diffusible substances by peritoneal irrigation is described. This procedure appears to have the advantage of simplicity and, when carried out as described, appears to carry little risk. It has the advantage over other methods of artificial removal of metabolites in that it requires little apparatus other than that available in routine hospital procedures. It may be a useful adjunct to treatment when conservative methods have not proved adequate, particularly in acute spontaneous potassium intoxication.

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TRANSDUODENAL SPHINCTEROTOMY FOR CHRONIC RELAPSING PANCREATITIS

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IT is now generally accepted that there are two types of acute pancreatitis: acute pancreatic edema, and acute pancreatic necrosis. Repeated attacks of acute pancreatitis are classified as chronic relapsing pancreatitis that may progress, in rare cases, to pancreatic cysts, fibrosis, lithiasis or calcification. It is possible that all these conditions represent different stages of the same pathologic process.

The purpose of this paper is to present observations based on 23 cases of relapsing pancreatitis.

Acute pancreatic necrosis is relatively unusual. Acute pancreatic edema, on the contrary, is a common disease. Since Elman,[1] in 1935, called attention to it as a clinical entity and since the introduction of a simple test for serum and urinary amylase by Somogyi[2] three years later, awareness of its existence has slowly increased. There can be little doubt that many cases of relapsing pancreatitis have been, and are still being, overlooked. Failure to recognize this recurring syndrome is due partly to the misconception that all cases of acute pancreatitis must conform to the classic description of acute hemorrhagic pancreatitis. It is due in part also to omission of the serum amylase test during attacks of pain in the upper abdomen, regardless of severity. Primarily, however, it is because the symptoms are attributed to other conditions, notably gall-bladder disease, with which relapsing pancreatitis is frequently associated. Once the gall bladder has been removed, and the patient continues to have periodic episodes of pain, such diagnoses as post-cholecystectomy syndrome, cystic-duct syndrome, biliary dyskinesia and various neuroses have been made. It seems highly probable, in the light of present knowledge, that relapsing pancreatitis has been the cause of the symptoms in many cases of post-cholecystectomy syndrome.

ETIOLOGY

The key to the problem of causation is the sphincter of Oddi. Although acute pancreatitis may be caused by accidental or surgical trauma, certain viruses and vascular phenomena, in the majority of cases the process is initiated by obstruction at the sphincter by a stone, edema or spasm. It is an established anatomic fact that the duct of Wirsung enters the common duct just proximal to the sphincter in a fair proportion of persons. Thus, closure of the sphincter can create a common channel between the common and pancreatic ducts, allowing bile to enter the pancreatic duct and (a point not generally appreciated) pancreatic secretions to enter the common duct and gall bladder. Popper,[3] for example, found amylase in gall-bladder bile in 16 of 18 cases of acute pancreatitis, and this finding has been confirmed by others. Doubilet and Mulholland[4] state that "alkalinization of bile salt solution by pancreatic juice renders it toxic and causes reactive edema and necrosis." Indeed, Gambill[5] believes that there is some reason to suspect that gall-bladder disease itself may be secondary to relapsing pancreatitis.

Furthermore, Doubilet and Mulholland[6] have shown by cholangiographic and kymographic studies that spasm of the sphincter can be caused by hydrochloric acid, by drugs such as morphine and by emotional disturbances. Excessive consumption of alcohol, often associated with acute pancreatic necrosis, probably causes obstruction by local edema, as well as by spasm resulting from increased hydrochloric acid formation.

CLINICAL PICTURE

So far as sex distribution is concerned, reports differ sharply. One can clarify the confusion by pointing out that acute pancreatic necrosis is much more common in males, and acute pancreatic edema in females. In this series there were 20 women (87 per cent) and 3 men (13 per cent).

TABLE 1. *Age Distribution in Chronic Relapsing Pancreatitis.*

AGE GROUP	NO. OF CASES	PERCENTAGE
yr.		
30–40	5	22
40–50	6	26
50–60	4	17
60–70	5	22
70–80	3	13
Total	23	

Relapsing pancreatitis can occur at any age. In this series, the cases were almost evenly distributed among the age groups above thirty (Table 1).

Symptomatically, acute pancreatic necrosis is manifested by severe pain in the upper abdomen and persistent vomiting, and the disease may rapidly reach a fulminating state. It is frequently preceded by an alcoholic spree. It may be difficult to differentiate from perforated ulcer, coronary thrombosis or high intestinal obstruction.

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Acute pancreatic edema is characterized by pain in the upper abdomen ranging from mild to severe, with nausea and vomiting. It is seldom preceded by overindulgence in alcohol. It is difficult to distinguish from gall-bladder disease in its various manifestations.

The location of pain is of considerable diagnostic significance (Table 2). Epigastric pain radiating straight through to the back, which is strongly suggestive of pancreatitis, occurred in 14 of the 23 cases. The location of pain in the remaining cases

TABLE 2. *Location of Pain in Chronic Relapsing Pancreatitis.*

LOCATION		NO. OF CASES	PERCENTAGE
Epigastrium through to back		14	61
Plus left upper quadrant	2		
Plus right upper quadrant	1		
Plus substernal	1		
Epigastrium, no radiation		2	9
Epigastrium, plus substernal		2	9
Epigastrium, plus right upper quadrant		2	9
Epigastrium, plus left upper quadrant		1	4
Epigastrium, to right shoulder		1	4
Not stated		1	4
Total		23	

is shown in Table 2. It should be noted that the pain was primarily epigastric in all cases, regardless of varying sites of radiation.

Findings on physical examination depend on the magnitude of the attack. There is always epigastric tenderness, which may be present in one or both upper quadrants. There may be muscle spasm, temperature, leukocytosis, transient clinical or subclinical jaundice and glycosuria. In mild attacks, many of these signs may be absent.

The most important laboratory sign is elevation of the serum amylase, which is nearly always high

TABLE 3. *Signs and Symptoms in Chronic Relapsing Pancreatitis.*

SYMPTOM	PRESENT	ABSENT	NOT STATED
	NO. OF CASES	NO. OF CASES	NO. OF CASES
Pain	23 (100%)	0	0
Vomiting	20 (87%)	1 (4%)	2 (9%)
Jaundice	7 (30%)	16 (70%)	0
Glycosuria	5 (22%)	18 (79%)*	0
High serum or urinary amylase or diastase	8 (35%)	9 (40%)	6 (27%)

*Not determined.

in the early stages of severe attacks but returns to normal as the attack regresses. Mild attacks may show no rise in serum amylase; in the free intervals, it is normal. It must be recalled that serum amylase may be elevated in other conditions, such as perforated duodenal ulcer and small-bowel obstruction. One patient, not reported in this series, was operated on for what was thought to be pancreatitis because of pain in the upper abdomen and a high serum amylase. Subsequently, she proved to have partial small-bowel obstruction from talc granulomas.

Table 3 presents the clinical diagnostic criteria of the disease in this series. Seven patients showed either clinical or subclinical transient jaundice, 5 showed glycosuria, and 8 had a high serum or urinary amylase, or both. The attacks may extend

TABLE 4. *Duration of Chronic Relapsing Pancreatitis.*

DURATION	NO. OF CASES	PERCENTAGE
yr.		
Less than 1	7	30
1 to 3	6	26
Over 3	10	43

over a period of years, and tend to increase in severity as time goes on. Table 4 shows the duration of disease in these 23 cases.

In nearly all published reports, there is a high incidence of gall-bladder disease co-existing with relapsing pancreatitis. In this series, 12 (52 per cent) of the 23 patients had gallstones; in 2 of these cases stones were also found in the ampulla of the common duct. In 1 case (4 per cent), the gall bladder was edematous, but no stones were present. Seven patients (30 per cent) had had a previous cholecyst-

TABLE 5. *Diagnostic Signs in Chronic Relapsing Pancreatitis.*

SIGN	NO. OF CASES	PERCENTAGE
Abnormally tight sphincter	13	56
Abnormal pancreas (edema, fat necrosis, induration, positive biopsy)	11	48
Elevated amylase	8	35
Stone at ampulla	2	9
Clinical history and examination alone	3	13

ectomy for stones, and in 3 cases (13 per cent) the gall bladder was normal.

Relapsing pancreatitis, therefore, should be suspected in every patient who presents a diseased gall bladder or who has symptoms after cholecystectomy. Further corroborative diagnostic evidence can be obtained at operation by careful inspection and palpation of the pancreas and peripancreatic tissues (Table 5). Evidence of fat necrosis, old or recent, edema and induration is frequently detected. In this series, 11 patients had one or more of these signs. After an attack of acute pancreatic edema, the pancreas may return to normal, so that its condition at operation depends on the recency of an acute attack, and the number and severity of attacks.

In addition, in many cases, exploration of the common duct reveals an abnormally tight sphincter, which will admit with difficulty, if at all, only the smallest probe. This was true in 13 of the 23 cases in this series.

Since the evidence is overwhelming that spasm of the sphincter is an important etiologic factor in

relapsing pancreatitis, it is logical to expect improvement if the sphincter is divided.

Operation

Archibald,[7, 8] in 1918, first performed sphincterotomy. More recently, Doubilet and Mulholland[6] reported transection by means of a sphincterotome in a relatively large number of cases. In our series, transduodenal sphincterotomy was performed in all cases. This lessens the danger of forcing an instrument blindly through a tight sphincter and, in addition, affords an opportunity to visualize any disease at the ampulla. Only a few technical points need be mentioned here. The operation is preferably not done during an acute attack. The gall bladder should always be removed if the sphincter is to be cut. One obtains the best exposure of the sphincter by passing a large Bakes dilator through the common duct to the sphincter, and curving it so that the dilator tents the anterior duodenal wall. An incision 1 cm. or less is made through the duodenal wall directly over the dilator. The sphincter is then presenting in the wound, and a stay suture is placed posteriorly in the sphincter to prevent retraction. The sphincter is divided anteriorly over the dilator for about 1 cm. At this point, the dilator is withdrawn a short distance, and a probe is passed into the pancreatic duct to verify the existence of a common channel. This obviates the necessity of a cholangiogram during the operation. A T tube is then inserted in the common duct through the sphincter, and left in place for about six weeks to prevent contracture during healing.

The operation is simple, and carries a morbidity comparable to that of ordinary cholecystectomy and choledochotomy. No cases of ascending cholangitis, and no deaths have occurred in this series.

Table 6. *Period of Follow-up Study.*

Period	No. of Cases	Percentage
yr.		
Less than 1	12	52
1–2	7	30
2–3	4	17

Of the 23 patients, 20 have been completely relieved. One patient had an attack similar to previous ones, the day the T tube was withdrawn, but has had no others in about three years; before operation she had been having weekly attacks. Another patient returned with abdominal pain, and x-ray examination showed a gastric ulcer not present on a previous film. Three months after operation the third patient, whose pancreatitis was due to a stone at the ampulla, had an attack of severe pain with jaundice, but a normal serum amylase. The attack subsided, and she has been well since. This may have been due to another stone in the common duct that was overlooked at operation.

Results

Evaluation of results must necessarily be made on the basis of the time elapsed since operation. Table 6 shows the extent of follow-up study in these cases.

This series is too small, and the follow-up period too short, to permit final evaluation of the effectiveness of sphincterotomy. However, the prompt and dramatic cessation of attacks for the periods shown has been encouraging and significant.

The fact that only 4 sphincterotomies were done two or three years ago, and 12 during the past year, implies more frequent recognition of the disease. Furthermore, it should be said that since the first sphincterotomy was performed in this series, there have been a total of 116 operations on the biliary tract. Excluding the 7 sphincterotomies on patients who had had previous cholecystectomies, 109 operations remain, in 16 of which, or about 15 per cent, the pancreatic component was considered sufficiently obvious to justify the addition of sphincterotomy to the operative procedure. Since it is well known that 15 to 20 per cent of patients have recurrent symptoms after cholecystectomy alone, it is suggested that the number of these may become fewer as indications for sphincterotomy become more familiar.

Summary and Conclusions

Repeated attacks of pancreatic edema or mild pancreatic necrosis constitute the syndrome of relapsing pancreatitis, which is much more common than was formerly realized. It is often mistaken for gall-bladder disease, which nearly always accompanies it.

The diagnosis can often be made by the clinical history alone. It can be verified by certain clinical signs and laboratory tests, and further substantiated by operative findings.

Transection of the sphincter is a rational, physiologic and effective method of treatment.

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CURRENT JUDGMENTS ON METABOLIC CONTROL AND COMPLICATIONS IN DIABETES

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THE problem of most immediate theoretical and practical importance in diabetes is the causation of complications. Do they result from disturbance of the phase of metabolism that is mediated by insulin? Are they therefore preventable by a diet-insulin combination that restores normality according to standard laboratory tests? Or, on the other hand, are the so-called complications an inevitable part or sequel of the disease? Are they uninfluenced by sugar control, or only partly preventable? These questions put the complications on a par with the fatty liver of totally depancreatized dogs, implying an additional chemical or hormonal factor, which must be found and corrected before prevention can be attained.

My approach to this problem and my extreme position in favor of control have been on record before and after the discovery of insulin, with the stated object of preventing both progression and complications. The next opinion in point of time was that of Woodyatt,[1] whose diet plan was directed toward utilization of theoretical kinds and quantities of foods rather than chemical normality, and whose restraint after the advent of insulin was based only on progression: "Old cases with fixed tolerance limits have been found difficult to keep sugar-free at all times, owing to unavoidable variation of diet, insulin dosage, exercise, etc., and it does not seem necessary that they do so, since they seem to have no natural tolerance to lose."[2]

Today, thirty years after the general introduction of insulin, the complications, especially the vascular scleroses, are the overwhelmingly predominant causes of diabetic deaths. It must also be recognized that the control of most cases both in this country and throughout the world is lax according to chemical standards. It is timely to appraise the available evidence and decide whether these conditions are cause and effect, or whether they merely signify that patients live longer.

EXPERIMENTAL CONSIDERATIONS

Information from animal experiments thus far is scanty but suggestive. The importance of species must be understood — for example, as a determinant of susceptibility to hydropic degeneration and the consequent decline of food tolerance. A few weeks may suffice for practical disappearance of such cells in the ordinary course of diabetes in partially depancreatized dogs[3] or in normal cats sufficiently overdosed with glucose.[4] In rats and some other laboratory species the susceptibility is much less. In man there is an intermediate destructibility, as evidenced by the clinical course of diabetes. In unchecked juvenile diabetes the decline of tolerance may be rapid and extreme, but the very extensive loss of islands that may be found after a fatal course of a year or two does not indicate as rapid degeneration as in the dog. Older persons illustrate the operation of a factor besides simple hyperglycemia, for even with high and uncontrolled sugar the loss of tolerance is slower and sometimes only slight for many years. Obviously, under these conditions hydropic cells must be scarcer and harder to find. Furthermore, as proved experimentally, the degeneration is checked or even reversed by insulin administration (which further demonstrates the factor of functional overstrain). It is therefore logical to find by autopsy that the most striking examples of hydropic islands occur after the intense functional stress of diabetic coma in children or adults. Also, inadequate insulin treatment, with disregard of high sugar, reduces but does not abolish the functional overstrain; consequently the decline of tolerance is retarded but not stopped in the great majority of susceptible patients.

Although insulin enables depancreatized dogs to live for years, the difficulties are such that the control is usually very incomplete in a clinical sense. Theoretically, such animals should furnish examples of the complications of partially controlled diabetes, so far as the canine species may be subject to them. Actually, the following lesions have been reported: arteriosclerosis of the aorta; cataract in 8 of 10 depancreatized dogs kept alive for two years (but much less frequent in alloxan diabetes); nephropathy in a depancreatized dog; and early glomerulosclerosis in a dog with pituitary diabetes.[5] On the contrary, one dog with severe diabetes that followed partial pancreatectomy was controlled as nearly as possible according to clinical standards, and when nearly fifteen years old, after twelve years of diabetes, it not only retained unusual, youthful liveliness (probably because the usual obesity of senile dogs was prevented) but also was free from organic or vascular disease in a thorough pathological examination.[6]

The needed comparisons on a decisive scale between animals with well controlled and those with poorly controlled diabetes will necessarily require years, and may be supplied by Ricketts[7] or others. A personal communication from Ricketts mentioned the following observation:

> This animal, aged thirty-six months, had had alloxan diabetes for thirty months, had never received insulin and had spilled on the average 100 gm. of glucose

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daily in the urine. At death, which was due to a surgical accident during biopsy, a complete autopsy was performed, and the histologic sections showed definite atherosclerosis of the coronary arteries. This lesion is exceedingly rare in normal dogs, and its appearance in a three-year-old dog with uncontrolled diabetes seems to me significant.

Clinical Opinions

Recently, plans being made for a local exhibit afforded an opportunity for collecting the opinions of scientifically and clinically recognized authorities throughout the United States, with the notable exception of New York City, where all degrees of control of diabetes are recommended and where the arguments for a "free diet" were recently expressed.[8] Although it was not possible to canvass all qualified judges, those consulted constituted a representative sample in a number of major cities in the United States; they were generally in favor of control.[9-22] In addition, the published works of Colwell,[23] Duncan,[24] Jackson et al.,[25, 26] John,[27] the Joslin group[28-30] and others[7, 31] testify to the necessity for control. Sherrill[32, 33] is convinced that incomplete control may lead to vascular and retinal lesions in many patients with diabetes of twenty-five years' duration. On the other hand, Sprague,[34] of the Mayo Clinic, regards the question as still open: although degenerative complications are likely to develop in patients with poorly controlled diabetes, he believes that lack of control is not the sole cause of such complications (he states, however, that until control has been ruled out as a factor, it should be urged on all patients). Greenhouse[35] has not found it practical to achieve complete control; he and his associates attempt to keep the fasting blood sugar between 150 and 200 mg. per 100 cc. (Folin-Wu technic), in the hope of staving off the accelerated aging process of the diabetic patient.

Wilder,[36] who holds an "intermediate" position between strict control and free diet,[37] states that although such complications as retinitis and Kimmelstiel-Wilson disease may be preventable by rigid programs of control, he has repeatedly seen patients with retinitis associated with diabetes so mild that control was easily achieved: "This experience left me skeptical of the advantages of very rigid management."

Discussion

Two cases illustrate the basis of the opposing or confused clinical views on this problem. One, a male patient now twenty-seven years old, became diabetic at the age of fifteen months, was treated elsewhere for two years and has been under my supervision since then. He has scrupulously followed his program of diet and insulin, 70 units daily, for thorough control of sugar in urine and blood even when several years away from my direct observation. He enjoys complete health, and special examinations have shown nothing abnormal in the eyes or arteries or elsewhere. The other, an unmarried Jewish woman now forty-nine years of age, has known of the existence of diabetes since 1933. She has consulted me about once a year since 1935, and is the only patient who thus comes with a frank and friendly intention to disregard advice. Heavy glycosuria and blood sugar levels above 200 mg. per 100 cc. have been the rule rather than the exception. She omits nothing in the way of good dinners and other luxuries in her ordinary life and especially on occasional trips abroad. The insulin dosage for this standard of control is about 64 units daily, which has not had to be increased since 1939. She maintains normal weight and excellent subjective health. Her ophthalmologist finds nothing wrong, and electrocardiogram and arterial x-ray films are pronounced normal. Her happy-go-lucky determination to enjoy life and take a chance on future consequences illustrates the cheerful psychology that is claimed for the "free diet."

Considerable confusion has resulted from overlooking two fundamental facts. In the first place, complications do not depend on severity of diabetes. The great majority of them occur in inherently mild cases or in severe diabetes that has been practically converted into mild diabetes by partial control. Secondly, whatever the nature or cause of predisposition may be, it is a highly important factor. Only individual susceptibility can explain why cataract or retinitis or gangrene or nephritis or neuritis occurs in different cases as the pre-eminent lesion, or why it occurs early or late. I warn the woman mentioned above and all other exceptionally resistant patients of the strong likelihood of diabetic troubles if they live long enough.

A general survey leaves no doubt that the great preponderance of experimental and clinical evidence favors control of diabetes, but the vast majority of cases in the United States and still more in other countries are not controlled in any real sense. The ignorance and carelessness of patients can often be rightly blamed; nevertheless, the majority are largely influenced by the attitude and personality of the physician. Inadequately trained physicians are apt to treat diabetes in the easiest way, and their qualifications are not held up to any such professional standards as in the performance of surgical operations or the treatment of cardiac or other conditions. Above all, the minority of specialists who teach lax control, or none, are responsible for confusing the general practitioners, who must handle the great mass of patients. One point is the exaggeration of the frequency or danger of hypoglycemia, instead of advice how such difficulties can be avoided with thorough control. Again, there is the widespread notion that a normal blood sugar is detrimental and hyperglycemia actually beneficial in aged or cardiac patients. This is a muddled interpretation of the stimulation of the heart and general metabolism with glucose injections in normal persons. But the diabetic hyper-

glycemia is due strictly to impaired utilization, not increased supply. It therefore boils down to a contention that improved utilization of sugar will be harmful. The theoretical fallacy of this interpretation is further confirmed by the practical experience of myself and others in maintaining all sorts of patients with a normal blood sugar. The greatest source of confusion consists in statistics purporting to show similar incidence of complications in controlled and uncontrolled cases. The decisive answer lies in a flat declaration that these allegedly controlled cases were not controlled in any true sense. Just as I have long challenged physicians or consultants to show a single one of my own patients who has ever had any kind of complication while following treatment, so also I challenge others to show cases with complications in which the record will not show marked and long-continued deficiencies of control. The "free diet" propaganda is not a gospel of deliverance from outdated hardships. Failure to rectify abnormal metabolism and the impulse to blame the consequences on an assumed tendency to progression come down from the darkest past of diabetes. Any witness of the wholesale blindness, crippling and death that result must weigh personal and institutional responsibilities for rashness that carries even a slight risk of augmenting these tragedies. The essential need is accuracy of statistics regarding "control" to settle all doubts on this question.

The first announcement[38] of the undernutrition principle stressed merely control of glycosuria and acidosis. From the beginning, there was clear recognition of the fundamental question: Does control in the laboratory sense actually halt the morbid process, or is there an underlying disease that will progress and bring its usual consequences more slowly but inevitably in spite of symptomatic control? The first guidance was from animal experiments, showing that the progressiveness of clinical diabetes can be precisely imitated in dogs[39]; recent reports by others have demonstrated typical complications in animals with uncontrolled diabetes. Furthermore, my earliest clinical experience, both before and after the introduction of insulin, made me the first to set up the standard of normal blood sugar in diabetic treatment.[40] The opportunity for a convincing demonstration with diet treatment alone was lost in the principal clinical experience,[41] which, owing to divided and antagonistic control, had to be criticized as "a record of blunders and mismanagement." Statistics of 505 cases at the Physiatric Institute[3] marked the beginning of records of patients under insulin treatment; if they could have been continued as planned they might have obviated the present confusion and disputes.

The statistics on salt exclusion in hypertension[42] also had to be broken off after only four years, though the validity of the combined clinical and experimental work is at last receiving increasingly strong confirmation. Aside from the frequent coexistence of hypertension with diabetes, the damaging effect of each on retina, kidney and blood vessels in general suggests possible additive injuries, so that salt may predispose the patient to lesions that appear as typically diabetic. Sodium chloride is the principal mediator of vascular tone and tissue turgor, and influences edema and circulation in various regions (including retina and kidneys), even without hypertension. These considerations have led me for many years to follow a rule that uncomplicated cases of diabetes require only regulation of sugar without salt restriction, but that every kind of beginning abnormality in large or small blood vessels is an indication for salt-free diet. This combined regulation cannot arrest some of the far-advanced complications, which in eye or kidney or coronary vessels may be as hopeless as advanced gangrene. But opponents may be asked the following questions: If a saltless diet is universally employed when hypertension has reached a terminal stage of congestive heart failure, why is it not a logical prophylaxis against this stage? Does anybody dare to omit control of diabetes in treating gangrene or other advanced complications, or does anybody fail to perceive the usual influence of such control? Then why should the influence at earlier stages be questioned?

As a summary of personal experience, I find that the blood sugar can nearly always be kept within normal range (not above 150 mg. per 100 cc. throughout twenty-four hours) without frequent hypoglycemic troubles and without spoiling the happiness of any sincerely co-operative patient (except for the rare "labile" patients). With this control, in addition to salt restriction when indicated, complications are absolutely prevented or, when existing, are generally arrested. There has been apprehension of the most formidable test, — namely, the patient who is predisposed to arteriosclerotic gangrene or some other degenerative process even in the absence of diabetes, — but in more than thirty years no such patient has appeared. Therefore, in contrast to the universal tradition, I have suggested that the reward of diabetic patients for their strict care may be a lower incidence of premature degenerations than among the general population. This hopeful position is placed on record for disproof or confirmation by anybody who will duplicate the methods.

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URINARY-TRACT INFECTIONS IN DIABETIC WOMEN*

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THE gravity of urinary-tract infections in diabetes is indicated by past studies[1-6] and the fact that a recent review of 100 autopsies upon diabetic patients dying in the New England Deaconess Hospital in the years 1945 through 1950[7] showed that 30 per cent had suffered from significant infection. This presents a serious problem in addition to the effect upon life expectancy when one considers the cost of hospitalization, nursing care, bacteriologic studies and the use of the new antibiotics.

As an illustration of this problem, it is pointed out that 51 among the first 52 diabetic patients referred for a special follow-up treatment of urinary-tract infection were women. The predominance of bacteria commonly found in the colon suggests the possibility of urethral contamination since blood-borne infections should occur with equal frequency in the two sexes. Improved teaching and practice of rectal and perineal hygiene might prevent many such infections, although it must be admitted that the atonic bladder common in diabetes and associated with cystocele and calculi will still play a part in their etiology. In a large group of diabetic women, recently questioned, not one admitted ever having been instructed to clean away from the vagina after bowel movements in an effort to prevent urethral contamination, despite the well known frequency of diarrhea in diabetes. The question is raised whether or not this is a factor contributing to the causation of pyelonephritis.

Clinically, many patients present a distressing picture of the relentless progression of pyelonephritis, characterized by systemic evidence of infection, local extension of the infection (renal and perinephric abscess), septicemia, disturbance of the diabetic state with difficulty of control, increasing rate of vascular degenerative complications, renal failure and death. A recent experience is instructive.

Case Reports

Case 1. Mrs. F. M. T., a 50-year-old woman, was first seen in March, 1950. Diabetes of 12 years' duration had been uncontrolled for long periods, and at least 2 attacks of diabetic ketosis had occurred. Urinalysis at the first visit showed an albumin of 400 mg. per 100 cc., and the sediment was packed with white blood cells. Studies, including pyelograms,

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during a subsequent hospital admission led to the diagnosis of bilateral chronic pyelonephritis. The blood nonprotein nitrogen at that time was 27 mg. per 100 cc. The urine culture was positive for *Aerobacter aerogenes*. The clinical course was not favorably affected by any of the numerous antibiotics given in large doses for long periods. For several weeks she was a "salt-loser" with a marked sodium deficit, and in the following months there were signs of increasing renal functional impairment, with uremia. During 2 subsequent hospital admissions she was treated for acute exacerbations of the pyelonephritis and for uremic coma. She died outside the hospital early in 1951.

Paucity of complaints or physical findings is striking, and urinary-tract infections may be discovered only by careful and repeated urinalysis. It should be emphasized that advanced pyelonephritis may exist without local signs and symptoms.

Case 2. J. H., a 42-year-old woman, was admitted to the hospital in September, 1950, because of severe gastroenteritis and uncontrolled diabetes. For 7 years the diabetes had received poor dietary control. Constant glycosuria and repeated diabetic ketosis had occurred. She had previously had a vaginal hysterectomy, repair of a cystocele and rectocele and hemorrhoidectomy. Urinalysis revealed pyuria in both a "clean" voided specimen and a catheterized specimen. *Staphylococcus albus* and *A. aerogenes* were obtained by culture. Intravenous pyelograms gave unmistakable evidence of bilateral chronic pyelonephritis. The patient repeatedly denied present or past urinary symptoms, and there was no local tenderness. She was discharged to continue use of Gantrisin, 4 gm. daily for 2 weeks. A later urine culture was negative, and examination of the sediment revealed only 2 white blood cells per high-power field.

The tenacity of the urinary-tract infections of diabetic patients has led to the following dictum in such cases: "Once a urinary-tract infection always a urinary-tract infection." However, the mere association with diabetes should not be regarded as making therapy useless, for even in nondiabetic patients a permanent eradication of the infection is difficult. Rhoads et al.,[8] treating a general group of patients with urinary-tract infections, found that only 8 to 15 per cent without obstructive uropathy were "permanently cured." When obstruction to the urinary flow is present, it is almost impossible to effect a cure. Above all, one must look for and correct causes of urinary stasis, particularly in patients who respond poorly to treatment.

With all the chemotherapeutic agents now available, the prognosis should be more hopeful than the past experience has justified. The present study was designed to test the hypothesis that more frequent bacteriologic examinations and more intensive treatment would give better results.

Method

A special follow-up clinic was established in the Outpatient Department of the New England Deaconess Hospital for ambulatory diabetic persons with urinary-tract infections. At each visit a urine specimen is obtained by catheter for complete urinalysis, for culture and for sensitivity tests when indicated. The patient is examined for symptoms and signs of infection. During the last year 52 patients with proved urinary-tract infections were followed in this clinic. Many had previously been under observation in the hospital, either for unrelated conditions or for the urinary-tract disturbances. Others had diagnostic studies as outpatients. Urine cultures were positive in all. Cases of suspected infection in which the diagnosis did not appear tenable after the first visit were not seen further in this clinic and are not discussed here. Patients who expressed an initial willingness to co-operate in the investigation were selected.

Material

The series consisted of 1 male and 51 female patients; the ages ranged from nineteen to seventy-eight years, averaging forty-nine and a half. The duration of diabetes ranged from one to twenty-nine years, averaging eleven and a half years.

In 31 cases the diagnosis was first suggested by symptoms. In the remainder the diagnosis was first disclosed only by pyuria (more than 10 white blood cells per high-power field in the sediment) on routine urinalysis, and there were no present or past symptoms of urinary-tract infection. Of these 21 patients 3 were found to have pyelographic evidence of chronic pyelonephritis, and in a fourth acute pyelonephritis followed an abdominal operation.

The majority of the 52 patients had major medical or surgical complications: hypertension (1 case), arteriosclerotic heart disease (2 cases), congestive heart failure (2 cases), cerebrovascular accident (1 case), foot lesions (3 cases), duodenal ulcer (2 cases), irritable colon (1 case), carcinoma of the colon (2 cases), leiomyosarcoma of the stomach (1 case), myxedema (2 cases), acute pancreatitis (1 case), chronic pancreatitis (1 case), psychiatric disorders (2 cases), pregnancy (5 cases), osteoarthritis (2 cases), subacute combined degeneration of the spinal cord (1 case), cholelithiasis (4 cases), twisted ovarian cyst (1 case), pararectal abscess (1 case), diabetic coma (1 case), diabetic retinopathy (6 cases), glaucoma (1 case) and cataracts (1 case).

The complicating conditions of the urinary tract included: cystocele, unrepaired (3 cases); cystocele, repaired during course of study (1 case); cystocele, repaired previously (1 case); cystocele, recurrent (1 case); atonic bladder (1 case); carcinoma of bladder (1 case); history of passing kidney stones (3 patients, 1 of whom had also had a ureterolithotomy); and clinically significant vascular nephropathy (3 cases).

The types of urinary-tract infections together with the results of treatment, are presented in Table 1. No case of recurrent infection is reported because in none of these cases did the records conclusively indicate that a past infection had been cured.

The general term "chronic urinary-tract infection" was adopted for cases in which pyuria in a catheter specimen and positive cultures indicated infection but the symptoms, history, physical examination or pyelograms did not provide a specific

and limited location for the infection. Nearly all the cases of pyelonephritis, both acute and chronic, were bilateral.

The chemotherapeutic agents and doses generally used in this series were as follows: Gantrisin,* 1 gm. five times daily through the waking hours; sulfacetamide, 1 gm. three times daily; and sulfadiazine, 1 gm., with an equal amount of sodium bicarbonate, five times daily. In acute stages and until the infection was under control, 2 gm. of Gantrisin every six hours was given.

The following antibiotics were used during the hospital stay: procaine penicillin, 300,000 units intramuscularly twice daily; streptomycin, 0.5 gm. intramuscularly twice daily; aureomycin, 250 to 500 mg. every six hours orally; chloramphenicol, 250 to 500 mg. every six hours orally; and terramycin, 250 to 500 mg. every six hours orally. One patient in the unimproved group received in addition a course of bacitracin. Frequently, combinations suited to the individual case were used. Because of the known effect of chloramphenicol on the hemopoietic system, it should be used only when sensitivity studies indicate that no other drug is effective.

Table 1. *Types of Infection and Results of Treatment.*

Diagnosis	No. of Cases	"Cured" Patients	Improved Patients	Unimproved Patients
Acute pyelonephritis	10	2	8	0
Chronic pyelonephritis	15	0	7	8*
Acute cystitis	6	1	5	0
Chronic cystitis	3	0	0	3
Chronic urinary-tract infection	18	2	9	7
Totals	52	5	29	18

*Includes 1 death.

Probably many of the patients in the "improved" or "unimproved" groups would have had a better result with more complete co-operation, especially in the frequency of visits. Of those with chronic pyelonephritis who were "unimproved" 1 (Case 1) died. Three of the remainder are being seen regularly and are following the course of progressive renal failure.

Examination of the records of the entire series indicated that in many cases the diagnosis of urinary-tract infection could have been made earlier on the basis of pyuria, symptoms or past history of bladder dysfunction. Earlier treatment might have had a favorable influence on results.

Bacteriology

Table 2 lists 79 strains obtained from 52 patients. The most commonly encountered organisms included *A. aerogenes*, *Esch. coli*, *Staph. aureus*, hemolytic *Staph. aureus* and hemolytic and nonhemolytic streptococci. Less frequently *Str. viridans*, *Proteus vulgaris*, *Str. faecalis* or *Pseudomonas aeruginosa* was found. Eighteen cultures showed two or three bacteria.

The most formidable organism was *A. aerogenes*, which seemed highly pathogenic and in 2 cases developed a total resistance clinically and in vitro to all drugs and antibiotics. One of these patients (Case 1) died. Wilhelm and his associates[9] reported this organism in 49 per cent of 257 consecutive urine cultures, and commented on its rapid increase as an infective agent in urinary-tract infection. Yow[10] found that, in the group of gram-negative bacteria, *Esch. coli* was becoming less frequent and proteus and pseudomonas organisms were increasing in frequency. Perhaps the apparent increase of certain strains of bacteria is due in part to more intensive bacteriologic studies, stimulated by the development of antibiotics.

The bacteriology in certain cases has shown a variation from time to time. In a large series of urinary-tract infections Rhoads et al.[8] noted that in 15 to 30 per cent of the cases different species were cultured after the original bacteria disappeared under treatment. Yow[10] found that during or after antibiotic therapy, particularly in urinary-tract infections, pseudomonas or proteus infections displaced the original infections. This may be, in part, simply a result of more rapid multiplication of resistant strains after susceptible strains have succumbed during therapy. However, patients seriously ill with urinary-tract infection show remarkably constant bacteria from one culture to the next.

Table 2. *Incidence of Organisms in Initial Cultures.*

Organism	No. of Cases
Escherichia coli	21
A. aerogenes	11
Nonhemolytic streptococcus	11
Hemolytic *Staph. aureus*	9
Staph. aureus	7
Hemolytic streptococcus	6
Streptococcus faecalis	4
Unidentified gram-positive cocci	3
Proteus organisms	2
Diphtheroids	2
Staph. albus	1
Shigella alkalescens	1
Bacillus subtilis	1

For some years, a rule has been in force for diabetic patients that any urine obtained by catheter, for any reason whatever, should be subjected to bacteriologic culture. Positive cultures in patients without urinary symptoms are due occasionally to contamination by faulty technic in catheterization. This seemed understandable as a result of the pressures resulting from the nurse shortage. Accordingly, the technic employed in this series and indeed for all diabetic women required 2 nurses (or a physician and nurse) who carried out the following procedure:

The patient is placed on an examining table with the feet on stirrups at table-top height. One nurse stands beside the patient, widely spreading the

*Available from Hoffmann-LaRoche, Incorporated, Nutley, New Jersey.

labia with the tips of the fingers and the thumbs of both hands. The other saturates a number of sterile cotton balls in a sterile solution of green soap and water and with a sterile forceps uses these to wash the entire introitus. The same forceps is used to rinse the introitus by means of sterile cotton balls saturated in sterile water and to dry it with dry sterile cotton balls. All this equipment is discarded. Careful not to contaminate its contents, the second nurse opens a sterile pack containing forceps, cotton balls, two small rubber catheters, medicine glass and a test tube and cork. She fills the medicine glass with aqueous Zephiran chloride solution, and then puts on sterile rubber gloves. She uses the forceps, cotton balls and Zephiran solution to wash the urethral orifice and adjacent mucous membrane. She inserts the large end of the catheter into the test tube, which she holds in her left hand near the patient, and with her right thumb and index finger she inserts the pointed end of the catheter directly through the urethra, being careful not to touch the distal 5 or 8 cm., which actually enters the bladder. When the test tube is half full, it is removed from the end of the catheter, which is pinched off between the right thumb and index finger. The tube is set into a nonsterile rack with the left hand, which then picks up the sterile cork from the pack and inserts it. This specimen is used for bacteriologic studies. The left hand then picks up from the table a clean, nonsterile specimen bottle. This is partially filled from the catheter, which is then withdrawn. This specimen is used for complete urinalysis and sediment examination.

A comparison of cultures in two series before and after the adoption of the more precise two-nurse technic of catheterization showed that sterile cultures increased from 14 to 34 per cent. We believe that the difference is due to improved technic, with elimination of contaminated cultures.

Pathogenesis

The common means of spread whereby the kidney becomes infected are hematogenous, obstructive and retrograde. The last seems to be the most common way in which pyelonephritis develops in female diabetic patients. Obstruction to the urinary flow occurs in urethral stricture, tumors and so forth, and stasis from other causes such as cystoceles and the atonic bladder of diabetic neuropathy will invariably be followed by urinary-tract infections; the correction of these abnormalities, if possible, is the *sine qua non* of effective therapy. Hematogenous spread from carbuncles, abscesses and so forth is now less common than before the days of good diabetic control and the relatively recent development of antibiotics. In only 1 case in the present series did the mode of spread seem to be hematogenous, after a series of abscesses. Obstruction of the urinary flow was not a predominating factor in this series. In a woman with bilateral pyelonephritis, retrograde pyelography indicated partial obstruction at the ureteropelvic junction on one side. Contributing factors often leading to urinary stasis included cystoceles (6 cases); calculi (3 cases); bladder operation for carcinoma (1 case); and pregnancy (5 cases). The process of catheterization was responsible in 2 cases.

The ratio of 51 female patients to 1 male patient contrasts with the known sex incidence of diabetes.[11] For example, women constituted 58.5 per cent of 2376 admissions for diabetes to the George F. Baker Clinic at the New England Deaconess Hospital in 1950. Urinary-tract infections in the male diabetic patient are often traceable to boils or carbuncles, calculi or prostatism. In women we believe that many of these infections arise by contamination of the bladder through the short length of urethra from the perineum. The bacteria found could migrate from a vulva that has been contaminated with fecal organisms.

Poorly controlled diabetes results in glycosuria, pruritus vulvae and local irritation from scratching, with possible secondary infection. More important is the impaired tissue resistance, which is maximal during ketosis. Although ketosis produced by high-fat diets was once used to control urinary-tract infections in nondiabetic patients, ketosis and acidosis in diabetes are commonly associated with severe urinary-tract infection. Indeed, the danger of catheterizing a diabetic patient in acidosis is so well known that it is common practice to employ catheterization for as short a period as possible and to prescribe antibiotics at the same time.

Since the advent of antibiotics and chemotherapy, there is a tendency to disregard many of the important collateral therapeutic efforts that may be regarded as prophylactic. The outstanding preventive measure for infections of the bladder and pyelonephritis, according to Campbell,[12] is scrupulous cleansing of the genitalia, particularly in small girls. Cleansing and wiping of the female perineum and anus should be from before backward. Occasionally, in small children the introitus is packed with feces. The question may well be asked why infections are not almost universal. In diabetic patients the vulva and perineum are traumatized by scratching for relief of pruritus. They are all the more vulnerable because diabetes itself lowers the resistance of the skin and tissues to invasive bacterial infection.

Management

The instruction of the patient should begin as soon as the diagnosis of diabetes is made. Preventive measures are of the greatest importance. Our present program is as follows:

Prophylaxis

Control of diabetes means that a diet planned by the physician to provide carbohydrate, protein and

fat in proper proportions with adequate minerals and vitamins has been normally utilized with the aid of insulin. When this is done, urine tests performed daily will be sugar free at least in the morning before breakfast. Pruritus and local irritation will cease.

Rectal hygiene, especially in women, should be emphasized. Contamination of vulva and urethral orifice with organisms from the colon must be avoided by cleansing toward the anus and not toward the vagina.

All catheterizations, therapeutic or diagnostic, should be performed with good visualization and best possible aseptic conditions. For female patients 2 nurses are required, 1 to spread and hold the labia while the other inserts the catheter. The patient must be on a high examining table with stirrups.

Whenever a retention catheter is necessary or whenever any surgical procedure is carried out on the urinary tract, prophylactic chemotherapy may be given. Three hundred thousand units of procaine penicillin mixed with 0.5 gm. of streptomycin intramuscularly twice daily or Gantrisin, 2 to 5 gm. by mouth daily, have been recommended.

Obstructive or static abnormalities of the urinary tract, although they are usually discovered after the infection has already begun, can occasionally be corrected before an infection.

Diagnosis and Treatment

Symptoms indicative of urinary-tract infection require examination and culture of a catheter specimen whether or not pyuria is present.

Whether or not symptoms are present, patients with 10 or more white blood cells per high-power field in the sediment are suspect. In male patients the glans is aseptically prepared with sterile soap and water, a "first-glass" specimen is discarded, a "second-glass" specimen is used for ordinary urinalysis, and a "third-glass" specimen is obtained for culture. A complete urinalysis is done every time a culture is done. To spare female patients unnecessary catheterizations a "clean specimen" is obtained by having the patient void after the vulva has been cleansed with soap and water to minimize contamination by extraneous matter. If this specimen contains 10 or more white blood cells per high-power field, a catheter specimen is obtained for examination and culture. Here the most zealous aseptic technic is necessary to prevent false-positive urine cultures and contamination of the bladder. The diabetic urinary tract cannot tolerate contamination.

If the clinical picture indicates urinary-tract infection other than pyelonephritis, no sensitivity studies are done initially, but the patient is given Gantrisin, 4 to 6 gm. daily for fourteen days. If the culture is positive at the end of that time, sensitivity tests should be done to determine the antibiotic of choice. Any patient with evidence of pyelonephritis should have antibiotics initially. For medical and economic reasons treatment with antibiotics should be preceded by sensitivity studies, with all antibiotics likely to be of value. The most useful agent is then given for ten to fourteen days in maximal doses. In cases of infection with two or more organisms with different sensitivities more than one agent may be necessary at one time. At the end of this period a culture (but not sensitivity studies) is obtained. If the same organism is present, the next best antibiotic or combination is selected. If the bacterial flora changes entirely, it has to be treated as an entirely new infection if one is to take advantage of any usefulness of the less expensive drugs. No urine cultures are done until the patient has been without medication for two days or more.

We have generally given generous doses for fairly long periods, not only for therapeutic efficacy but also in the hope of preventing the development of resistance in the bacteria. If the patient can tolerate oral medication, Gantrisin, sulfacetamide or sulfadiazine may be given simultaneously with antibiotics. We have maintained the practice of alkalinizing the urine whenever sulfadiazine is given. Since streptomycin is most effective in an alkaline urine, these two agents make an effective combination.

We have tried in this manner to treat each patient until the criteria for a "cured" case have been met (see Table 3) before discharge from the clinic.

TABLE 3. *Criteria for Results of Treatment.*

RESULT	SYMPTOMS	PYURIA	CULTURES
"Cured"	Absent	Absent (*must have all 3*)	3 final cultures negative
Improved	Improved	Improved (*must have all 3*)	1 or more negative for pathogens
Unimproved	Unimproved	Unimproved (*any 1*)	All positive for pathogens

Then the only follow-up study consists of the clinical examination and complete urinalysis done with each diabetic checkup, usually every three months. If pyuria or symptoms of infection appear, the procedure is repeated from the beginning, as in a new urinary-tract infection.

So far, we have not made a practice of using prophylactic chemotherapy; however, it may be of value when positive cultures recur repeatedly after one or two negative cultures or when the bacterial flora is subject to change.

SUMMARY AND CONCLUSIONS

Among 52 patients referred to a special clinic for urinary-tract infections 51 were women, suggesting that the cause was urethral contamination rather than blood-borne infection.

The infecting bacteria were predominantly colon-dwelling organisms, a fact consistent with an urethral transmission of the infection.

Prophylaxis should include the prompt and repeated instruction of all diabetic girls and women in the importance of perineal and rectal hygiene.

Only 5 cases were cured and 29 improved by intensive use of antibiotics.

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MEDICAL PROGRESS

GENERAL PRACTICE, TODAY AND TOMORROW*

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RAPID social, technical and scientific advances have done a great deal to improve the health of the nation. The rapidity of development and the attempts to make available to as many people as possible the benefits of modern knowledge and technic have brought about a complex health-service structure that tends to become more and more impersonal, and more and more imbalanced as between the technical and the human elements.

However, in spite of these developments, the general practitioners of the nation are still, and will continue to be, responsible for the greater part of the medical care of the people. For example, they are still responsible for 75 per cent of the total pediatric care (in many places, 100 per cent), 76 per cent of the obstetric care (in many places, more than 90 per cent) and a great deal of the surgical care. Again with a calculated shortage of 15,000 psychiatrists, it is reasonable to assume that the general practitioners are carrying responsibility for by far the greatest part of such psychiatric service as is being provided today. Without documentary evidence, it is probably reasonable to assume that the general practitioners are providing the majority of the medical care in such fields as gynecology, dermatology and urology.

In the broad and basic area of internal medicine, despite the fact that there are now more than 12,500 full specialists in this field, no one would seriously dispute that general practitioners in the aggregate carry responsibilitity for most diagnosis and treatment, or that in certain parts of the country, particularly rural, they are virtually 100 per cent responsible. According to the 1950 census 36.2 per cent of the entire population of the United States live in places where such conditions prevail.

The primary health need of any nation as socially, technically and scientifically advanced as this is for a health service instrument that will offer an intimate, personal service to which the *individual* can turn for assistance and guidance in time of physical or mental distress; and a sound, *basic* diagnostic and therapeutic service that will assure the *individual* a good, first line of protection against the *common* hazards of illness and injury.

Despite technical progress, hospital development and the use of "screening" devices, culturally, theoretically and to a large degree in practice the family doctor is this instrument.

Any assessment of the health needs of the nation therefore depends basically on an assessment of the success or failure of general practice in discharging these responsibilities.

General practice is here considered against this background and an attempt is made to assess the degree of success attained, to analyze the elements on which this success rests and to set down some principles that might further the growth and development of this and any other related instruments of health service leading to the ends set out above.

In present circumstances it is not possible to talk about general practice as a single, definable entity. It is first necessary to analyze the various elements and patterns of practice.

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Types of General Practitioner

Broadly speaking, there are three categories of general practitioner.

The first consists of the general practitioner who, after graduation, has had one or two years of hospital training (frequently a rotating internship), and has then entered community practice. This doctor at his best should be able to diagnose and treat at least 80 per cent of the illnesses with which he is faced, and should be able to understand his patients as people and to guide and assist them with their personal and family problems.

The second class includes the general practitioner with additional training in internal medicine. This doctor has had a year or more of residence in medicine at an approved hospital before going into community practice; he may even have been certified by the American Board of Internal Medicine. He is frequently the technical superior of the physician referred to above, but his field of endeavor is wholly comparable.

The third comprises the general practitioner who is a specialist. He may have reached specialist status by virtue of training (such as qualification by the American Board of Internal Medicine), but more frequently he has developed advanced skills in a particular direction — for example, surgery, obstetrics and anesthesiology — by diligent application, by utilizing postgraduate educational opportunity and by years of hard-won experience. The outstanding and most controversial example of this type is the general practitioner who is also a surgeon. As these doctors advance farther and farther into their specialty field, they can give less and less time and attention to the personal problems of their patients and at some time reach a point where lack of practice combined with interest in a single field makes it impossible for them to fulfill the functions of a general practitioner.

The first mentioned of these types frequently reaches his peak of professional performance by accident and instinct, and many factors prevent him from reaching the level he should attain. The other two categories have the chance to use established channels of medical education. They arrive at the professional level they choose either by the relatively rapid process of formal hospital training or by the slow and arduous path of self-development while actually practicing in a community.

It is possible to elaborate and qualify this classification in many ways, but it provides a good working background against which to consider general practice, although it must be recognized that there are general practitioners who, for a variety of reasons, do not meet the standards — that is, a capacity for sound diagnosis and an ability to cope with the personal problems of people — claimed for the physicians described above.

This unfortunately is by no means a small or insignificant group. For the most part these physicians are victims of cultural and professional forces over which they have little control, or demonstrate little ability to control. They have been cut off from the sources that would normally permit them to develop personally and professionally and are yet forced by public demand to make a showing of abilities and skills they may not possess. These factors and others prevent them from being satisfactory general practitioners in any of the categories described above.

For the most part each of these types of general practitioner falls into reasonably definable social, economic and professional situations, which must be discussed before the problem of general practice can really be understood.

Broadly, there are two patterns of practice — urban and rural. Although they have certain things in common, there are many points of dissimilarity.

Urban Practice

The urban practitioner, surrounded as he is by readily accessible consultant, laboratory and hospital services, rarely covers the broad scope of work or assumes the high level of responsibility of his rural counterpart.

The scope and nature of the urban general practitioner's activity is in great part determined by the financial, social and educational status of his patients. In the poorer, more densely populated city areas, he frequently works alone without nursing or other assistance, disassociated almost completely from his colleagues (specialist and general practitioner) and often without hospital privileges. A physician in this group usually undertakes the "care" of people from birth to death. Some still assume obstetric responsibilities, but with the rapid development of hospital and specialist obstetrics this is passing from their field.

The very conditions under which these physicians have to work permit only a superficial and unsatisfactory approach to the problems of diagnosis and therapy. Major problems, to be satisfactorily handled, must be referred to the hospitals and clinics in the area.

Some general practitioners in these circumstances, through an inherent or acquired sympathy for the problems of the oppressed, achieve excellent results in the form of guidance and counseling, but contrariwise some of them develop a resistance to the overwhelming appeals for assistance. This type of environment is not attractive to physicians of professional or personal ambition, and like any bad environment it tends to perpetuate itself and to become increasingly worse.

This pattern of practice is common to the large cities of the English-speaking world. There are, of

course, individual exceptions to this generalization — such as individual doctors of exceptional talent and zeal, who to some extent overcome their environment; it is doubtful if there are any exceptions to the total pattern.

In urban areas populated by higher-income groups, the picture is modified. Whereas the general practitioner in this area covers much the same scope of work (with an ever-decreasing responsibility for obstetrics and pediatrics but with sometimes the addition of limited surgical responsibility) circumstances permit and frequently demand the exercise of a higher level of diagnostic, if not therapeutic, skills and a somewhat greater attention to the personal problems of people.

This, like the former, is a universal pattern. It is sometimes complicated by an "informed" public demand that the physician possess some of the more expensive and complicated diagnostic machinery. As a consequence, it is not uncommon to find the general practitioner's office equipped with quite elaborate x-ray facilities and to find him undertaking a wide range of radiologic diagnoses.

It is somewhere at this point that the physician of limited training crosses the threshold between the sins of clinical omission and the sins of clinical commission. Here again economic and social circumstances rather than objective professional and human consideration determine the nature of general practice.

Just how much better this situation is than the one previously described is debatable. A section of it undoubtedly is, and the movement toward general-practice specialization seems to have its genesis in this environment.

Rural Practice

Rural practice similarly falls into a pattern with two major subdivisions. The general practitioner working in true rural isolation is in many ways a counterpart of the one practicing in poor urban areas. However, here circumstances rather than economy seem to dominate the pattern. Divorced as the truly isolated rural practitioner is from the hospital, laboratory and specialist facilities, he has perforce to be self-reliant. The full weight of responsibility for human safety forces the conscientious physician to be well equipped to diagnose and treat everything short of major surgical and complicated medical problems. He has to be obstetrician and pediatrician to his community and must be able to handle all the minor surgical problems that arise from day to day. Living intimately with his people, he cannot escape being their personal physician in the deepest sense of this term.

The scope of work that this type of practitioner has to undertake is almost self-determined; the quality of his work is nearly completely a function of his own capacity and conscience. The vagaries of human nature, in the form of physician conduct, are best illustrated in this situation.

The second major pattern of rural practice is the small community practice where the physician, frequently of his own initiative, has developed a working environment that permits him to assume clinical responsibilities fully compatible with, or even going beyond, his training and skills. In this situation most general practitioners have open access to the facilities of a small community hospital in which they can usually undertake a reasonably high level of clinical investigation and perform almost any surgical procedure for which they feel themselves competent.

The undeniable fact that in these circumstances the general practitioner sometimes overreaches his capacity (most noticeably, his surgical ability) has brought this pattern of practice under heavy criticism and sometimes virulent attack. Too frequently these criticisms and attacks lack perspective and understanding and on occasion threaten to destroy what would become the pattern for better general practice.

It is here that the general-practitioner specialist flourishes, and this exemplifies the controversial area between specialists and general practitioners. It is regrettable that in this intraprofessional struggle concentration is on the relatively unimportant, if dramatic and tangible, sins of general-practice commission, when it should be on the far more important area of sins of omission.

To complete this analysis the whole scene should be correlated to the large hospital and medical teaching situation. In summary, the great clinical institutions have grown up in the large urban areas, and in the very shadow of these institutions is to be found some of the worst general practice both technical and personal; as one moves away from the large hospitals into the less densely populated and financially better off areas, the level of general practice rises and continues to rise with distance from these medical centers, reaching its peak in small rural communities and then falling off in areas of real rural isolation.

This paradoxical situation can almost be represented graphically. It results in part from a rapid development of hospital and specialist facilities with no concurrent development of general practice, which has merely adapted itself to changing circumstances. Much of this adaptation cannot be called progress. It is almost as though the medical profession had attempted to solve a slum-housing problem by building gigantic skyscrapers, in the midst of the slums, and little attention had been paid to the environment.

Problems of General Practice

The foregoing is a general analysis and requires considerable refinement before the problems of contemporary general practice can really be ap-

preciated. However, before details are presented, it is well to pause and consider such evidence as is available to substantiate what has already been said.

For those who want to look, there is abundant, observable evidence, very little of which has been recorded, to support all that has been said thus far. For those who do not want to look, there is, of course, none. A review of the literature of the last fifty years demonstrates a remarkable absence of objective data and opinion dealing with general practice; most of what has been written fails to descend from the realm of philosophical discourse and emotional claim and counterclaim. For obvious reasons, the available evidence is qualitative rather than quantitative; however, it can serve to establish the various patterns of practice described even if it does not permit more than a general assessment of how widespread these patterns are.

It is equally obvious that in a paper of this nature it is impossible to present a larger amount of evidence, because this must, in present circumstances, depend upon lengthy, detailed and anonymous description. It is not possible simply to cite statistical data dealing with performance in general practice, for very few such data exist. Recommendations given at the conclusion of this paper are designed to rectify this anomalous situation.

However, the serious attention at present being given to general practice after many years of neglect calls in the first place for qualitative rather than quantitative analysis — sound criteria must first be established before any worthwhile quantitative assessments can be made.

No objective observer would attempt to uphold the standards and nature of general practice as it is usually conducted in the poorer, densely populated areas of large cities. Most doctors working in these places have neither the time nor the opportunity to put into effect even the indispensable procedures of history taking, record keeping and basic physical examinations that all of them learned in medical school and hospital. To earn a satisfactory income from small fees they must do a great volume of work; to do this they must "cut clinical corners," and quickly they become "spot diagnosticians and therapists" not because of, but in spite of, their training and personal desires.

It is almost impossible to get factual data dealing with the diagnostic and therapeutic performance of these men. An example of such data, however, is provided by the experience of the Health Insurance Plan of Greater New York. Before this subject is considered one or two points should be made, to meet criticism of the validity of anything that happens in this huge city and in this particular program.

New York City is often regarded as being "freakish" and representative of nothing else, when actually it presents the quintessence of large-scale urbanization and medical organization designed to meet the demands resulting from its size. The particular program cited, the Health Insurance Plan of Greater New York (H. I. P.), whether one is for or against it as a medical development, does offer to the poor communities under discussion a more comprehensive medical coverage than they can otherwise obtain.

This program uses the services of approximately 400 general practitioners, the vast majority of whom continue to work as they always have, in and from their private offices. However, for their insured patients they can call on (without cost to themselves or their patients) all the radiologic and laboratory diagnostic aids they require.

Even so, it seemed apparent, from a survey conducted by the staff of H. I. P. in 1952, that busy doctors, working alone and divorced from the benefits of hospital and specialist assistance, dependent for a livelihood on small and sometimes uncertain fees, cannot do their work properly or meet the rigid standards required by modern medicine.

The findings of Reed and Failes, in Baltimore, and the experience of the Johns Hopkins Clinic were similar to what has been said above.

Some persons recently reviewing the New York Scene regard the general-practitioner situation as beyond "the point of no return" and have seriously suggested that elementary health examinations should be carried out by a specialist team. Impersonal multiphasic screening clinics have their origin in such opinions. For obvious reasons these are neither necessary nor desirable, and such superficial thinking is dangerous and wholly destructive to general practice.

To our knowledge, similar evidence pertaining to other types of practice is not available. Pullen compiled some data on rural practice in Mississippi, but his findings are quantitative rather than qualitative and tell little of how a community is served.

The scope of responsibility assumed by general practitioners in better-class urban and in rural practice varies greatly, as does the manner in which individual doctors practice. Circumstances sometimes permit them to do better work than their less fortunate colleagues in poorer areas and also to assume a greater degree of clinical responsibility. It is generally agreed that many of these doctors take on too great a responsibility for their training and skills — for example, their credentials and experience may not gain them a place on the staff of a large hospital, but they continue to do a level of work for which they have been adjudged unsuitable in their offices and in the smaller, less controlled hospitals.

So far as record keeping is concerned, it can be said, with little fear of contradiction, that the great majority of general practitioners keep poor records. The significance of medical records is more than academic; even if they do not tell all that is to be told about performance as a general practitioner,

they are certainly a key index to the quality of medical care. Few general practitioners' records are available as compared to those of specialists in hospitals, and additional means of assessing their performance must therefore be sought.

It is usually assumed that the general practitioner does too much or too little, but his actual functions have not yet been spelled out in any detail; in fact these are usually obscured in the philosophical discourses and homilies about general practice and the general practitioner. In the absence of recorded data a careful analysis of the actual activities of general practitioners working in the various environments described above is the starting point for any serious thinking about contemporary general practice.

What are the functions of the general practitioner in the various environments described above? The following is offered as a breakdown of function based on observations and interrogation of many hundreds of general practitioners over a period of several years.

Functions of Urban General Practitioners in Poor Economic Areas

"Spot diagnosis" in home and office. This comprises the greater part of the work of these physicians. Most of this work is consequent upon a rapid examination made because of specific signs and symptoms. Time and circumstance do not permit anything like complete history taking or physical examinations.

Advice and guidance based on the limited evidence that can be obtained quickly. This may be valuable in cases of mild emotional disturbance, but can be dangerous in more serious psychiatric conditions.

Treatment. Much of this must necessarily be symptomatic and is restricted almost completely to the use of common drugs, medicaments and minor physiotherapeutic equipment.

Radiology (x-ray diagnosis or fluoroscopy, or both). Many of these men have their own x-ray equipment. The more conservative restrict the scope of their work to the chest and the small bones, doing their own interpretation. Some attempt a wide range of radiologic diagnoses, such as barium series, cholecystography and pyelography.

Laboratory. Most of these doctors are equipped to do urinalyses, blood counts, hemoglobin estimations and sometimes sedimentation rates. A quite surprising number record and interpret their own electrocardiograms and many take basal metabolic rates. The amount of radiologic and laboratory work most of these men attempt seems to be correlated to their patients' ability to pay them (as distinct from an ability to pay specialists' fees) for these services.

Referrals. In the poorer areas referrals are usually to clinics and hospital outpatient departments. These physicians seldom have the time or opportunity for person-to-person consultation with specialist colleagues, and their patients can rarely afford private specialist consultations.

Minor surgery. Probably a majority of these physicians will open a superficial abscess or put in a few sutures.

Obstetrics. Some of this group still retain a small obstetric practice; 15 to 20 deliveries a year seem to be about the maximum load.

Major surgery. A small number of this group, with admitting privileges in small proprietary hospitals, attempt major operations such as tonsillectomies, appendectomies and gynecologic procedures.

Pediatrics. This is also approached on the basis of spot diagnosis, elementary therapy and advice and guidance based on such information as can be obtained quickly. Pediatrics frequently forms a major part of this type of practice.

Hospital work. Few of these men have worthwhile hospital appointments or the desire or opportunity to take seriously such appointments as they have. It is estimated that in New York City there are 2500 physicians without any hospital appointment and a majority of these probably fall in this category.

The great bulk of the work done by these physicians is spot diagnosis and elementary therapy. The volume of the other functions set out depends largely on the financial status of their patients.

These physicians continually face the insidious choice of doing too little or doing too much. In such circumstances, good and sometimes even safe medical care (not to mention "health care") is impossible.

Functions of the General Practitioner in Better-Class Urban Areas

This picture improves in degree, but not greatly in kind, in the better-income, urban residential areas. General practitioners in these more stable financial circumstances can sometimes but not always devote more time to individual patients. They frequently do more of their own x-ray and laboratory work, which appears, as stated above, to be primarily conditioned by the patient's ability to buy these services from them. This can be judged as good or bad according to assessment of the individual doctor's abilities. These general practitioners do less obstetrics and pediatrics (sometimes none at all) but, on the whole, more surgery, again largely for economic reasons, but occasionally because they have developed special skills and interest in this field. They may see more of their patients in their homes and for this reason alone probably do a better job of guidance in cases with functional components, but still present the same danger as mentioned above.

The functions of this type of general practitioner are amazingly constant throughout the English-

speaking world. In the countries of the British Commonwealth these physicians seldom make x-ray or electrocardiographic examination and so forth, and on the whole do less laboratory work than those in the United States. Otherwise, their functions are wholly comparable.*

Functions of the Urban General-Practitioner Specialist

The pattern changes markedly with the urban general-practitioner specialists (usually men eligible for certification by the American Board of Internal Medicine).† The classification of certified internists as general practitioners calls for special comment.‡ Most of these men try to restrict their practice to adult internal medicine (some also do a limited amount of pediatrics). They still make home calls, frequently only because of economic pressure or strong patient demand. They do a considerable amount of hospital work and more frequently have good hospital connections. They usually exclude surgery (even minor) completely and limit radiologic work to fluoroscopic and chest examinations. Many of them do their own electrocardiographic, basal metabolic work and so forth. A better financial return for effort more readily permits the employment of ancillary staff such as nurse secretary, and at this level the "spot-diagnosis" proposition largely comes to an end.§

With this improved clinical or technical situation there arises the real problem of the breakdown of intimate personal service. The younger physician, who has struggled for specialist recognition simply does not want to be a general practitioner; in the true sense of the word he has aspired to the status of consultant and wants what he believes to be the benefits of this status.

This is well illustrated by the complaints received against the H.I.P. groups using board-qualified internists as general physicians. Two groups that use almost exclusively qualified men and that undoubtedly deliver an extremely high quality of medical care rate badly (as contrasted with some groups using doctors without such qualifications) so far as patients' complaints about attitudes, human relations and home service are concerned. The same complaint is occasionally made of the general-practitioner surgeon (usually a rural practitioner) who has compromised his "personal" work for technical achievement in the field of surgery.

*Descriptive evidence of this type of practice in Great Britain is set out in the report "General Practice in England Today" (*Lancet*, March, 1950) and is supplemented and confirmed by the voluminous correspondence that followed publication of the article.

†Other general-practitioner specialists eligible for certification in surgery, urology, obstetrics and so forth are not considered here. These physicians are only transitory general practitioners supplementing their incomes until they are established specialists.

‡Within the framework of general practice used here the qualified internist should not really be classified as a general practitioner. The desire on the part of some members of the profession so to classify the specialist internist is unrealistic and more than anything else reflects the latest dissatisfaction with the present standards of general practice.

§This pattern is the same in British Commonwealth countries for general-physician specialists holding M.R.C.P. and similar qualifications.

This is a natural, human situation and should be studied closely, since it illustrates the balance or imbalance that can be attained between technocracy and humanism in the field of health care. It is closely related to education and social status and is discussed below in relation to education.

Functions of the Rural Practitioner

The scope of work and responsibilities embraced by the rural physician with access to a community hospital is considerably greater than any mentioned above. The chief additions to the functions described for urban practice are as follows:

Surgery. Much more major surgery is undertaken by general practitioners in these circumstances. Observation (nonstatistical) indicates that the "average" general-practitioner surgeon in a rural area, like the general-practitioner specialist discussed above, limits his operative procedures to a specific list.

Obstetrics. This is practiced in greater volume than undertaken by the urban general practitioner and with the inclusion of quite serious abnormalities (frequently requiring cesarean section and very occasionally a Porro section). Except in small cities that will support the services of a specialist obstetrician, the general practitioners undertake all obstetrics, but the most able and conscientious keep in touch with consultants regarding unfamiliar and serious complications that are pending.

Radiology. This is practiced to the upper limit of that described for the urban practitioner. Those with time, practice and experience place no reliance on their own diagnoses and have nearly all films interpreted by a roentgenologist.

Anesthesia. The rural physician gives anesthetics as considered necessary for the operative procedures undertaken. These are usually limited to intravenous inductions, open ether, nitrous oxide and oxygen and low-spinal anesthesia.

The functions listed above cover the "average" scope of additional responsibilities assumed by what might be called the "conservative group" of this type of physician. It is based on the interrogation and observation of the work of many hundreds of general practitioners working in comparable rural situations in the United States, Great Britain, Scotland, Canada, Australia and New Zealand. This "conservative group" seems to form the great majority of this type everywhere.

The "radical" minority extend their scope of work considerably farther but still seem to stay within definable limits. These men attempt major bowel operations for even diagnosed malignant conditions, thyroid surgery and much more difficult orthopedic surgery, but this seems to be about the surgical maximum.

Rarely, radiotherapy and even radium therapy are attempted under the conditions described. Some of

these men also embark on anesthetic adventures using endotracheal and high-spinal technics, cyclopropane, closed circuits, curare and so forth, which may or may not be successful, depending on the original and postgraduate training.

The studies on which the above description is based also demonstrated by observation (without statistical documentation) that the work done by the conservative group of rural practitioners is frequently more thorough and complete, right across the medical board — history taking, record keeping, investigation and diagnosis (quite apart from the therapeutic procedures practiced) — than in the majority of urban situations.

The scope of work that all general practitioners undertake is partly determined by cultural demand and by economics. As personal physicians these doctors are again frequently superior to their urban counterparts; the factors bringing this about are the more intimate nature of rural life and the rapport established in a situation of greater human dependency of patient on doctor.

The additional responsibilities assumed by the rural community doctor force him, unless he is quite unscrupulous, into a much more satisfactory organizational situation in which he may employ nurses, secretaries and technicians.

Just as the unfavorable, densely populated urban environment tends to aggregate physicians content to labor under all the handicaps and limitation described, so "good" rural-community environments attract physicians of professional ambition who want to put into operation the skills in which they have been trained and that they hope to develop.

Limitations of General Practice

What should or should not be done by the general practitioner? There seems to be unwillingness everywhere to define this categorically. The American Academy of General Practice lays down as one of its objects, "to preserve the right of the general practitioner to engage in medical and surgical procedures for which he is qualified by training and experience," and this broad statement seems to have the endorsement of general practitioners in all countries.

However, the question must be asked, Is this right of self-determination of individual medical function, in relation to training, experience and ability, the correct way to a safe, high level of medical service for everyone? If the residency training program and economic and professional circumstances of general practice were considerably better than they are, the answers to these questions would almost certainly be affirmative. However, circumstances are far from ideal, and, as pointed out above, the individual general practitioner is by no means the master of his own professional destiny.

Can American medicine, therefore, afford to go ahead on a laissez-faire policy in relation to general practice, or should professional controls be put into effect at the level of training and community practice, similar to those long since accepted as essential at the level of specialist and hospital practice? Such a laissez-faire policy can no longer be afforded. It is because general practice has drifted for so long, while the various special branches of medicine have followed a charted and controlled course, starting with residency programs, that general practice is today in such an amorphous and frequently indefensible state.

With much right and reason on his side, the radiologist can attack the correctness of the general practitioner's undertaking work in this field. Similarly, the surgeon, the obstetrician, the gynecologist, the pediatrician and the rest of the specialists can attack him for his endeavors in each of these particular fields. Most of these attacks fail to stand up to examination where general practice is properly conducted.

No quantitative or qualitative assessments are available to describe a "properly" conducted general practice. Yet observation shows that there are hundreds (perhaps a few thousand) of physicians whose abilities and conduct might be taken as a pattern for all. These physicians have usually reached this level by accident or chance related to the socioeconomic environment of their practices and postgraduate education. Seldom do they reach early professional maturity through existing residency or specific postgraduate programs.

Never losing sight of the need for a large degree of autonomy and self-determination in general practice, one must define the province and function of the majority of general practitioners of the future, and correlate this with educational and training requirements and the means of establishing and maintaining standards. What follows is offered in an endeavor to do this.

So far there has been no realistic and satisfactory definition of general practice. The great majority of attempts to define this, the largest and considered by some the most important field of medical endeavor, have resulted in broad and often meaningless generalities. This failure of definition has a significance all its own, which will be examined before a practical, working definition is offered.

The main difficulties of defining the work of the general practitioner arise because, in what is loosely called "general practice," there are so many different kinds of physicians doing so many different things. In these circumstances it is greatly to the advantage of many men in the medical profession to leave the work of the general practitioner undefined, or loosely defined, because then the lines of definition can be vaguely drawn to satisfy the prejudices, fears, poses, preconceptions and hopes of different parts of the profession and the public.

General practitioners, themselves uneasy about discrimination in staff appointments, worried about the multiplication of boards of certification and defensive about their rights in certain specialist fields, seem to have avoided attempts to describe and evaluate the exact nature of their work.

Specialists, preoccupied with their own problems and concerned about standards and developments in their own particular fields, have had little time or inclination to think seriously about the man who must perform what are often considered to be the laborious, uninteresting and poorly compensated chores of the profession.

Medical educators also seem to have resisted defining the field of general practice. Faculty members are nearly all specialists, and have little or no opportunity of seeing or working with the general practitioner, in teaching hospitals, medical schools or the community. These teachers, isolated from the actual work of general practice, face the difficult problem of preparing a general practitioner for work that embraces some eighteen specialties, each with a separate board qualification. In these circumstances, it is naturally easier to deal with the problem by going around it than by attempting to define it and meet it head on. As a way out of this confusion, some educators have talked of producing "a new type of general practitioner" who, on close inspection, suggests the product of a *mésalliance* between the public-health officer and the psychiatrist — a product wholly incapable of meeting the practical medical requirements of the people.

It is obvious that there are certain specific advantages for a good many groups in the medical profession if the nature of general practice is left undefined. Other, more general circumstances contribute to this failure of definition. Probably the most important of these is the legitimate antipathy of many highly trained and able men for the professionally inadequate who are classed as "general practitioners."

As long as the nature of general practice remains uncertain, it will be impossible for medical authorities, or men in general practice to reach necessary agreement among themselves about what should be the extent of the general practitioner's participation in certain highly specialized fields. It will be equally impossible to establish the exact level of diagnostic and therapeutic responsibility.

Until a specific definition is furnished, it will be difficult to attract men to the field of general practice; it will be difficult to design a sound program for their education, and it will be almost impossible for them to work as general practitioners, with satisfaction to themselves, their profession and their community.

(*To be concluded*)

MEDICAL INTELLIGENCE

URTICARIA DUE TO DRUGS OF THE DIGITALIS SERIES

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NEW MILFORD AND NEW HAVEN, CONNECTICUT

IN 1936 Romano and Geiger[1] described a case in which eosinophilia was evidently attributable to digitalis medication, and reference was made to two similar previous reports.[2, 3] The familiar nausea, vomiting and diarrhea accompanying digitalis administration are generally regarded as local or systemic toxic expressions of digitalis excess and may sometimes represent an idiosyncrasy but not an atopic reaction to the drug. In fact, true allergy to digitalis or allied drugs has rarely been documented, but Cohen and Brodsky[4] reported a convincing case and reviewed the scant medical literature on the subject in 1940. The case described below appears to have been one of true allergy to digitalis preparations and was expressed as urticaria.

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REPORT OF CASE

An 82-year-old farmer's wife was seen in congestive heart failure with Grade 2 edema of the legs, basilar pulmonary rales and a palpable liver edge. The heart was enlarged and presented a Grade 3 rough murmur in the latter part of diastole at the apex. The heart rhythm was regular, with a rate of 87 per minute, and the blood pressure was 160/90. Electrocardiograms showed only left-axis shift. A diagnosis of probable rheumatic heart disease with mitral stenosis was made, but no history of rheumatic fever could be elicited, and, except for medical restraints imposed in childhood because of an "irregular pulse," the patient had lived an active life and worked the farm with her husband; she had borne 6 children without trouble.

At the age of 77 she began to be troubled periodically and progressively with exertional dyspnea, dependent edema and orthopnea. Digitalis, prescribed by another physician, had been beneficial but had been associated with the appearance of "itching lumps" on the chest and arms. It was learned that another physician had tried several other digitalis products, again with symptomatic benefits but with untoward dermatologic effects, because of which the patient had discontinued all such medication for 3 months and had lapsed into the congestive heart failure described above.

Observations were now newly undertaken to determine whether she was really allergic to digitalis. She received in succession digitalis pills of whole leaf, digitoxin (both orally and intramuscularly), digoxin, Digilanid, lanatoside C and Urginin (squill glycoside) with at least 3 weeks' interruption of medication between the various products. When digitaliza-

tion was induced rapidly within 48 hours or less, diuresis and symptomatic improvement resulted without the immediate development of urticaria. However, when maintenance dosage was continued for 5 days, or if the digitalizing amount was spread over 1 week, urticaria appeared. The lesions were pale, flat, raised and round, averaged 2 cm. in diameter and were scattered profusely over the chest, abdomen and upper arms, with areas of clear and of erupted skin about equally divided; the lesions itched. Each of the drugs was associated with about the same intensity of eruption, the urticaria worsened with continuation of the drug, and antihistaminic medication allayed the itching but did not abolish the lesions. The urticaria disappeared regularly when the drugs were discontinued, and the rapidity of dermal clearing was roughly proportional to the accepted duration of action of each of the digitalis bodies: 2 weeks after digitalis, 1 week after digitoxin and a few days after digoxin and lanatoside C. On 2 occasions when digitoxin was continued in the hope that desensitization would result, urinary frequency and urgency, with prolapse of the urethral meatus, developed. Cystoscopic examination showed a dusky edema of the bladder, which has also been described as an allergic manifestation.[5] This probably allergic cystitis disappeared, along with the dermal reaction, when the digitoxin was discontinued.

Eosinophilia did not accompany the urticaria, nor could positive responses be obtained on scratch and patch testing with the digitalis products; however, positive reactions to skin tests are often not obtained in cases of allergy to ingested drugs.

Summary and Conclusion

A case of urticaria associated regularly with the periodic administration of several drugs of the digitalis series is described in a patient who had not hitherto exhibited any allergic manifestations. The fact that highly purified as well as crude preparations from three different plant sources (digitalis purpurea, digitalis lanata and squill) were concerned suggests that the allergic response is attributable to the cyclopentenophenanthrene nucleus, which is common to all these cardiotonic glycosides. Conjoint use of antihistaminic medication did not prevent the allergic reaction.

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THE NECESSITY FOR ADDING ALBUMIN TO SERUM IN CROSSMATCHING

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BOSTON

THE "serum method" of crossmatching has been described in detail by Soutter, Allen and Emerson.[1] According to the authors: "This method has not failed to demonstrate high-titered 'albumin-active' anti-Rh in a serum regardless of the possible presence of prozone, when ordinary Rh-positive bloods were used."

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Recently, in work with the serum of a person highly sensitized to the Rh factor, the "serum method" of crossmatching failed to disclose incompatibility with Rh-positive blood. Because of this experience and a subsequent similar one, we consider it essential to withdraw the statement quoted above, particularly because the "serum method" is now being widely used.

The blood under investigation was from a fifty-one-year-old Group A, Rh-negative woman whose serum was found to contain Rh antibodies (anti-D) by a routine screening procedure. She was restimulated with small injections of Rh (D)-positive blood for the purpose of producing Rh-testing serum. With this procedure a high titer, 1:4096, of "albumin active" Rh-antibodies (anti-D) developed, and a pronounced prozone was present in the serum (Table 1).

Several crossmatching experiments were carried out with this serum. It was found that the "serum method" failed in most cases to reveal any incompatibility between the serum and Group A Rh(D)-positive cells, even though the Coombs test[2] carried out on the "serum-method" crossmatchings gave strong +++ and ++++ reactions in all cases.

Use of Bovine Albumin in Crossmatching

Since Diamond and Denton,[3] in 1945, introduced albumin as a medium capable of bringing out Rh agglutination in cases in which "incomplete" or "hyperimmune" antibodies were involved, this substance has been widely used for this purpose.

Experiments were therefore carried out to determine whether the addition of bovine albumin to the crossmatchings done by the "serum method" before the test tubes were centrifuged would enhance the agglutination sufficiently to reveal the incompatibility between the serum under investigation and Group A Rh(D)-positive cells.

The following three types of bovine albumin were used in the tests: "Armour" bovine albumin in a 20 per cent concentration‡; "Armour" bovine albumin in a 30 per cent concentration (original product); and "Ortho" bovine albumin in a 22 per cent concentration (original product).

Several experiments were carried out in which 1 or 2 drops of the albumin were added to the "serum-method" crossmatchings before the test tubes were centrifuged.

It was found that the addition of 1 or 2 drops of 20 per cent bovine albumin (Armour) did not reveal the incompatibility between the serum and Group A Rh(D)-positive cells in all cases, even though it did so in a few more cases than when the "serum method" alone was used.

When 2 drops of 30 per cent bovine albumin (Armour) were added to the crossmatchings the

‡This concentration was obtained by dilution of the original "Armour" product (30 per cent) with 0.85 per cent saline solution. The reason for testing with the 20 per cent concentration was that the "Armour" 30 per cent albumin, because of its high viscosity, is diluted, in many laboratories, to a 20 per cent concentration before it is used in blood-grouping tests.

incompatibility was obvious in all cases. The use of a single drop, however, resulted in some failures.

When either 1 or 2 drops of 22 per cent bovine albumin (Ortho) was used there was a clear-cut demonstration of incompatibility in each case.

Stronger reactions were obtained when 2 drops of albumin were used instead of 1 drop in these experiments. This was, of course, expected because the enhancement of agglutination, if the serum contains a prozone, is dependent not only on the protein concentration but also on the dilution factor.

Table 2 presents the results of the crossmatching experiments between this serum and the Group A Rh(D)-positive cells of 10 different persons. The cells of 2 Group A Rh(D)-negative persons were used as controls. In these experiments it can be seen that the "serum method" failed to reveal the incompatibility in 7 out of 10 cases and gave weak reactions in the other 3. The addition of 2 drops of 20 per cent bovine albumin (Armour) before centrifugation revealed incompatibility in 5 cases but 5 others were still missed. The addition of 2 drops of 30 per cent bovine albumin (Armour) demonstrated the incompatibility in all 10 cases. The addition of 1 or 2 drops of 22 per cent bovine albumin (Ortho) disclosed incompatibility in all 10 cases but stronger reactions were found when 2 drops were used.

On the basis of these experiments the following technic can be recommended for the "serum albumin" method:

Two drops of the recipient's serum are placed in one test tube and 2 drops of the donor's serum in a second test tube. With a pair of round, wooden applicator sticks, a few cells are removed from the donor's clot and mixed into the 2 drops of the recipient's serum in the first tube to make a 2 per cent suspension. The optimum number of cells thus transferred must be determined by experience, but in general, a number sufficient to give a cell button about 5 mm. in diameter in the bottom of the tube after centrifugation makes the results easier to read and therefore more reliable. The recipient's red cells are similarly mixed with the serum of the donor in the second tube.

Two drops of the thirty per cent bovine albumin (Armour) or 22 per cent bovine albumin (Ortho) are added to each tube, and the tubes are immediately centrifuged at 1000 revolutions per minute for two minutes. This produces a well formed cell button, with clear supernatant fluid above it. Too vigorous centrifugation results in a cell button that is tightly adherent to the bottom of the test tube and difficult to separate

TABLE 1. *Results of Titration of Rh Antibodies (anti-D) in the Serum under Investigation, by Means of Three Different Technics: Saline, Indirect Coombs and Albumin 20 Per Cent (Armour) Methods.**

TECHNIC	1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192
Saline method	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Indirect Coombs method	+++	+++	+++	+++	+++	+++	+++	+++	+++	++	+	+	(+)	—
Albumin in AB serum	—	W†	+	++	++	+++	++++	+++	+++	++	+	+	(+)	—

*In the albumin in AB serum a typical prozone was found. Albumin was used as a cell-suspension medium, and AB serum as a dilution medium for the serum.

†Weak reaction.

TABLE 2. *Results of Crossmatching Tests with the Serum under Investigation and the Cells of 10 Group A Rh(D)-Positive Subjects and 2 Group A Rh(D)-Negative Persons.*

CELLS	"SERUM METHOD"	BOVINE ALBUMIN 1 DROP ADDED			BOVINE ALBUMIN 2 DROPS ADDED		
		ARMOUR 20%	ARMOUR 30%	ORTHO 22%	ARMOUR 20%	ARMOUR 30%	ORTHO 22%
Rh(D)-positive:							
1	—	—	—	(+)	—	W	+
2	—	—	W	W	—	(+)	+
3	—	—	W	(+)	—	(+)	+
4	—	—	W	W	—	+	+
5	—	—	W	(+)	—	(+)	+
6	—	—	—	W	W	(+)	+
7	(+)	(+)	++	++	(+)	++	++
8	—	W	+	++	W	+	++
9	W	(+)	++	++	(+)	++	++
10	(+)	+	++	++	+	++	++
Rh(D)-negative:							
11	—	—	—	—	—	—	—
12	—	—	—	—	—	—	—

from it. This leads to inaccuracies in estimating the degree of true agglutination. The cell button should be examined immediately after centrifugation.

Tubes showing no agglutination should be incubated at 37°C. for twenty minutes, recentrifuged and again examined for agglutination.

Discussion

It should be emphasized that neither the "serum method" of crossmatching nor the "serum-albumin method" of crossmatching can be relied upon for disclosure of incompatibility due to the anti-K, anti-Fy^a or anti-JK^a antibodies. The Coombs test is still the only reliable means of demonstrating the presence of these antibodies. This is also true for Rh-incompatibility in cases in which the D^u factor is involved.

Since adopting this serum-albumin technic we have found another anti-Rh serum of high titer in which a prozone was present. This serum contained "incomplete" anti-D antibodies in a titer of 1:1024. When crossmatching experiments were carried out with this serum and Rh(D)- positive cells using the "serum method" and "serum-albumin method," it was found that the former method failed to reveal the incompatibility in half the tested cases whereas the latter revealed the incompatibility in all.

On the basis of this small but consistent experience with these two high-titered anti-Rh serums it seems advisable to discontinue the "serum" crossmatching method as a routine procedure and to replace it with the "serum-albumin" crossmatching technic.

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

Weekly Clinicopathological Exercises

FOUNDED BY RICHARD C. CABOT

Benjamin Castleman, M.D., *Editor*

Virginia W. Towne, *Assistant Editor*

CASE 39041

Presentation of Case

A thirty-two-year-old former miner's helper, a paraplegic, was admitted to the hospital for rehabilitation.

About ten months before entry, while bending over shoveling coal at work, the patient was struck on the small of the back by a fall of rock. He did not lose consciousness but had an immediate sensation of numbness and paralysis of both legs. He was carried face up, being held under the legs and armpits, to the shaft elevator and taken to a hospital. During the period of hospitalization he was placed on constant catheter drainage, mineral oil and enemas as needed, and given passive exercises and massage of the extremities once a day. Five months later because of persistent pain in the back, a spinal operation was performed. Casts were never used. One month later the patient began to experience crampy pains in his legs at times. A sensation of pins and needles was present in both legs for three months, but normal sensation had never returned. About two months before admission the catheter was removed, and he was permitted to void spontaneously. He was sent home at that time. For a month before admission he had ankle edema and erythema. Two weeks before entry he had a one-day episode of "cold in the kidney" associated with steady left-sided pain, and on the next day he passed bloody urine. No further hematuria occurred, however.

The patient had always been in good health before the accident except for a bout of malaria in the Philippines seven years before admission.

Physical examination revealed a well developed man in no distress. The heart, lungs and abdomen were normal. There was a large decubitus ulcer over the sacral area and an operational scar at the lower dorsolumbar area in the midline of the back, with no local tenderness. The testicles were completely insensitive to squeezing. The lower limbs showed considerable atrophy and foot drop. The patient could flex the hips 20°, but otherwise the legs showed a flaccid paralysis. There was complete anesthesia and analgesia from Poupart's ligament distally on the left and from about the midthigh on the right. Both legs showed absent reflexes. There was increased sweating of the right foot and leg but no increased warmth.

The temperature, pulse, respirations and blood pressure were normal.

The urine had a specific gravity of 1.010 and gave a ++ test for albumin; the sediment contained 25 red cells and a few bacteria per high-power

field and was loaded with white cells. Examination of the blood revealed a hemoglobin of 15.0 gm. per 100 cc. and a white-cell count of 14,100, with 69 per cent mature and 1 per cent young neutrophils, 1 per cent unclassified cells, 22 per cent lymphocytes, 4 per cent monocytes and 3 per cent eosinophils. The serum total protein was 7.25 gm., the albumin 4.81 gm., the globulin 2.44 gm., and the nonprotein nitrogen 47 mg. per 100 cc. A roentgenogram of the chest was normal. X-ray study of the thoracic and lumbar spine showed a severe old compression fracture of the body of the first lumbar vertebra, with marked narrowing of the twelfth thoracic intervertebral-disk space; the body of the first lumbar vertebra was displaced very slightly anteriorly in relation to the twelfth thoracic vertebra. Considerable bony overgrowth had occurred about the fracture between the twelfth thoracic and the first lumbar vertebras. There was irregularity of the transverse processes of the first and second lumbar vertebras that was probably due to the injury. There also appeared to have been an old laminectomy of the first and second lumbar vertebras. Calculi were observed in the urinary bladder, but none in the ureters or kidneys.

Shortly after lunch on the second hospital day the patient reached back for the light switch with his left arm, after which he had a sudden onset of severe, steady, left subcostal pain not accentuated by respirations. He vomited once without relief and retched repeatedly thereafter. On being questioned at this time he admitted having four loose bowel movements and some mild, generalized crampy abdominal pain on the day of admission but said that the present pain was completely different. On examination the heart and lungs were normal. There was no dyspnea or cyanosis. Marked tenderness was present in the left subcostal region, and to a lesser extent in the midepigastrium. There were no masses or real spasm. There was no flank or costovertebral-angle tenderness, but slight pain on the left on jarring. Peristalsis was almost absent. The remainder of the abdomen was soft and nontender. The temperature, pulse, respirations and blood pressure were normal. Pain subsided a little after administration of atropine and was minimal after 100 mg. of Demerol had been given, being felt only when the patient turned from side to side. Three hours later pain and tenderness were still present, but the physical findings were unchanged.

The pain persisted throughout the night and at 9 o'clock on the following morning the patient was found to be short of breath and slightly cyanotic. He denied any increase or change in character of the pain, which apparently was not made worse by breathing. On examination he was alert, but the skin was cold, moist and pale, suggesting to one observer a state of impending circulatory collapse. The left side of the chest was hyperresonant, with absent breath sounds, and the heart and trachea were deviated to the right side. These findings had not been present the day before. There was left-upper-quadrant tenderness, without spasm and with no sign of peritoneal irritation. The temperature was 98°F., the pulse 130, and the respirations 30.

One and a quarter hours later, after an x-ray examination of the chest with a portable machine, the patient died.

Differential Diagnosis

Dr. Edward D. Churchill*: Before discussing the diagnosis in this case I should like to comment on a few points in the history. I take it that the episode of "cold in the kidneys" was so labeled because the patient passed bloody urine. Later he had some urinary-bladder infection indicated by the great number of white cells in the urinary sediment and probably due to the long period of catheter drainage. The calculi in the urinary bladder I think it is safe to attribute to that infection, rather than to skeletal decalcification from immobilization.

"There was left-upper-quadrant tenderness, without spasm and with no sign of peritoneal irritation." I should add "no sign of pleural irritation" because that too produces spasm in the left upper quadrant.

The old compression fracture of the body of the first lumbar vertebra, the narrowing of the twelfth thoracic intervertebral-disk space and the slight anterior displacement of the body of the first lumbar vertebra all show that the patient had experienced severe external trauma to the spine.

I shall make my diagnosis before looking at the x-ray films. There is only one diagnosis that is consistent with the evidence at hand — evisceration of abdominal organs into the left pleural cavity through a rent in the diaphragm. The diaphragm was ruptured at the time the rocks hit him in the back. I am not going into any long academic dissertation on differential diagnosis. As far as I am concerned, this is the only possibility if the evidence is accepted as stated.

There are two or three interesting points for comment. Why did ten months elapse after the accident before the evisceration occurred, and why did it occur just as he arrived at the Massachusetts General Hospital? I should like to know how he was transported. Did he ride in a train?

Dr. Arthur L. Watkins: In a train and an ambulance.

Dr. Churchill: Quite a distance?

Dr. Watkins: Overnight.

Dr. Churchill: Was he in a roomette, compartment or lower berth?

Dr. Watkins: Such patients usually travel in a bedroom or a compartment.

Dr. Churchill: There is quite a difference in the physical forces at play depending on whether one is riding with one's long axis parallel with that

*Chief, Surgical Services, Massachusetts General Hospital.

of the train or lying transversely. I discovered that when I had my own hernia repaired and traveled in a roomette shortly afterward. I was rolled back and forth all night, and there was considerable strain on the new incision. If this patient was lined up with the long axis of the train, the viscera might have started their migration through the rent in the diaphragm just from the motion of the train. It should be remembered that he had been immobilized by his paraplegia since the accident.

Dr. Watkins: He was in a bedroom with the bed crosswise to the tracks.

Dr. Churchill: Another point of interest is that an evisceration into the pleural space destroys the mechanism of vomiting. It is interesting that the patient managed only once to throw up but he kept on retching and trying to vomit. When the stomach moves into the chest, the antral region becomes obstructed, the stomach fills with swallowed air and fluid and reaches enormous proportions — enough to give the tympany, absent breath sounds and displacement of the heart and mediastinum that were recorded in this patient on the following day. Sometimes, the x-ray film shows little but the stomach blown up like an enormous balloon, with a fluid level. In addition to the stomach, the spleen, omentum, small bowel and large bowel were probably in the chest, but my guess is it was the stomach that was so blown up that it was giving the signs of pneumothorax. One cannot vomit from a stomach that lies upside down in the chest cavity — one retches. To vomit, the diaphragm is set, and the abdominal muscles are contracted. This mechanism does not work when the stomach is in the chest.

In conclusion, I offer only one diagnosis, rupture of the diaphragm, evisceration into the pleural space and acute dilatation of the stomach.

Dr. Alfred Kranes: Why did you not consider the possibility of spontaneous hemopneumothorax?

Dr. Churchill: The statements of the record do not suggest it. At the time this pain occurred there was no change whatsoever in the physical findings in the chest. There were no dyspnea, no increase in respirations and no pleural pain from the rupture of an adhesion — nothing on the day of onset to point to a spontaneous pneumothorax. The next day the physical signs were those of a spontaneous pneumothorax.

A Physician: What about a spontaneous rupture of the esophagus?

Dr. Churchill: I thought about that possibility but did not know what to attribute it to. Here was a man who had been well, had not been vomiting and had nothing apparently to suggest an ulcer of the esophagus or ante-mortem digestion of the esophagus. If, in desperation, I had made a second choice, I might have chosen rupture of the esophagus as a blind guess.

Clinical Diagnoses

Acute gastric dilatation.
Paraplegia.

Dr. Edward D. Churchill's Diagnoses

Evisceration of stomach and other abdominal organs through traumatic rent in diaphragm.
Acute dilatation of stomach.

Anatomical Diagnoses

Evisceration of stomach and colon through traumatic rent in diaphragm.
Acute dilatation of stomach.
Fracture of eleventh and twelfth thoracic vertebras with spinal-cord compression.
(Paraplegia.)
Acute and chronic pyelonephritis.
Bladder calculi.
Coarctation of aorta.

Pathological Discussion

Dr. Benjamin Castleman: This photograph of the opened chest shows the collapse of the left lung, which was due, as Dr. Churchill predicted, to a rent in the diaphragm through which had passed the left transverse colon, the splenic flexure, some omentum and this huge reddish ballooned-out stomach lying up against the heart (Fig. 1). The stomach was enormous — it held 3 liters of fluid — and was turned up so that the greater curvature was superior just as Dr. Churchill described it; the only parts of the stomach that had not herniated through the rent were the cardiac orifice and the antrum. The rent was located about 3 cm. to the left of the esophageal orifice and extended laterally for 18 cm.; it was 5 cm. wide at its widest point. It was evidently an old rent because the pleural and peritoneal surfaces were fused and well healed, so that the hole must have been present ever since the original accident. There were no adhesions, probably allowing for free herniation or evisceration if one prefers that term. Does herniation mean that omentum has to protrude along with other organs?

Dr. Churchill: With herniation there has to be a sac.

Dr. Castleman: Then the correct term here is evisceration. It was not eventration, a congenital condition in which the rent occurs in a thinned-out diaphragmatic muscle. There was no evidence of peritonitis or pleurisy.

The black coal miner's lung is interesting. We rarely see that condition here. Some time ago Dr. J. Gough, of Cardiff, Wales, presented me with some of his pictures of coal miner's lung, which he sees regularly. This picture, which is that of a thin slice of the actual lung of one of Gough's cases, is similar to that seen in the lung of the patient under discussion: there are islands of carbon

with scarring surrounded by foci of emphysema (Fig. 2). This is the early stage and one in which there is usually no evidence of right-sided cardiac embarrassment; his lung picture was just about

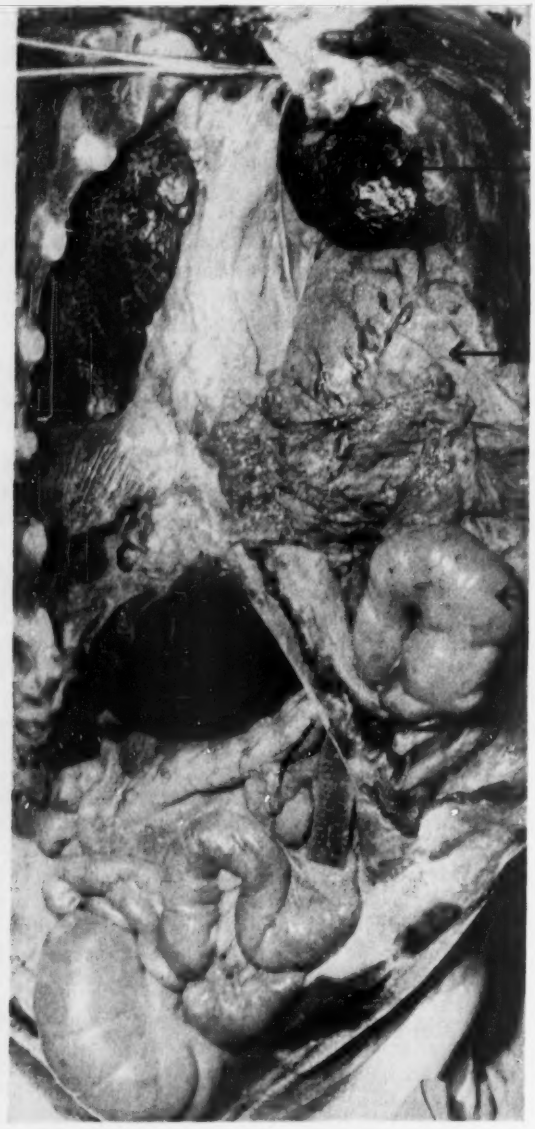

FIGURE 1. *Viscera In Situ.*
Arrows from top to bottom indicate the collapsed lung, dilated stomach, with engorged vessels in the serosa, and descending colon extending through the rent in the diaphragm.

at the stage at which failure of the right side of the heart begins. It is in the more-advanced cases in which the lesions become fused and much larger that tuberculosis may develop.

The kidneys were markedly infected because of the paraplegia; the infection, I am sure, was the cause of the stones in the bladder, which in turn caused the hematuria.

DR. WATKINS: We should have had Dr. Churchill see the patient the afternoon before he died. Should we have suspected that condition when he had the pain and retching without being able to bring up anything? Is that characteristic enough to make you think of evisceration?

DR. CHURCHILL: The evidence of severe external trauma and the frequent association of a rupture of

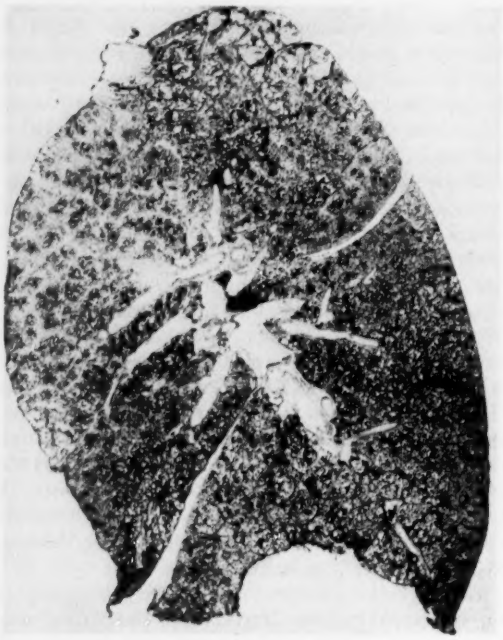

FIGURE 2.

the diaphragm with a severe fracture of the spine from direct force is very suggestive.

DR. CASTLEMAN: There is one more interesting finding in this man that we might discuss after we see the x-ray films.

DR. STANLEY M. WYMAN: In the original film of the chest and upper abdomen, there is nothing very startling. These films were interpreted as being within normal limits. The films of the thoracic spine and the lumbar spine show the severely damaged first lumbar and twelfth thoracic vertebras. The bladder stones are well seen in the anteroposterior view. Dr. Laurence L. Robbins made an acute observation on this set of films; he made a diagnosis of coarctation of the aorta based on the narrowing of the aorta at this point (Fig. 3). The aortic knob was much smaller than it should have been, and the aorta was constricted at this point. This is seen in the lateral view as a V-shaped in-

dentation in the posterior aspect of the aorta. Another and perhaps more important observation is that in these films taken for the visualization

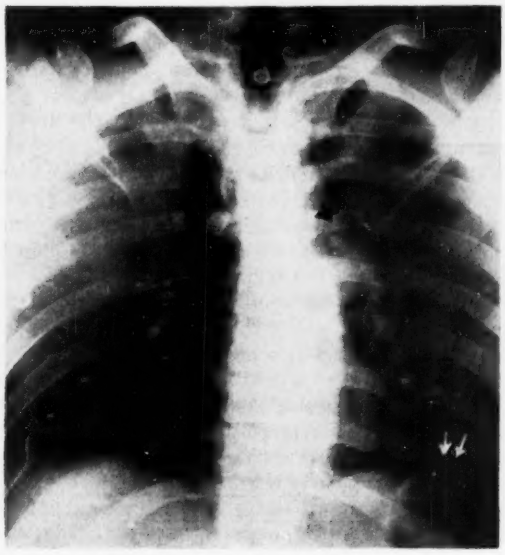

FIGURE 3. *Roentgenogram of the Thoracic Spine. Single black arrow points to narrowing of the aorta. Double white arrows point to loop of colon above the diaphragm.*

of the thoracic spine, there is a projection, slightly above the level of the left leaf of the diaphragm,

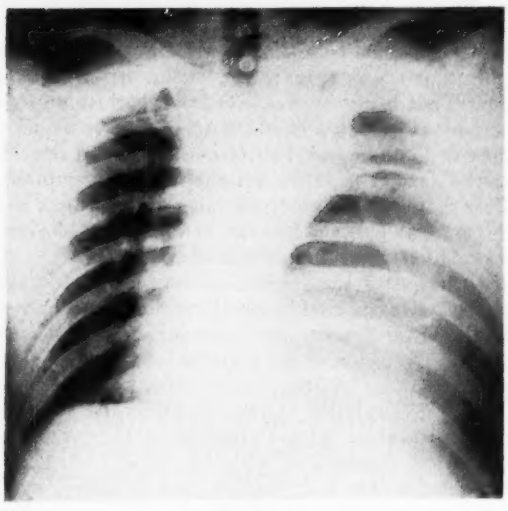

FIGURE 4.

of a loop of colon, which I am sorry to say we did not appreciate originally (Fig. 3). This can be seen in the lateral view as well, where the loops of colon are much more clearly visualized than they are under normal circumstances because they are adjacent to air-containing lung. The film taken with a portable machine an hour before death shows, as Dr. Churchill predicted, this enormously distended organ, the stomach, containing fluid and air (Fig. 4). The fluid level is not seen because the film was taken in the supine position. One can see the compression of the lungs, which now occupy this small space, and displacement of the heart and mediastinum to the right.

DR. CASTLEMAN: Dr. Robbins was shown these films while the autopsy was being done, and one of the house officers rushed over and asked if we had found the coarctation. The prosector had already found it. It is interesting that the coarctation was 3 cm. lower than the usual coarctation and was surrounded with a good deal of connective tissue. We toyed with the idea that the injury might have produced a coarctation like that. However, the injury was too high, and microscopical sections gave no evidence of old blood in that region.

CASE 39042

PRESENTATION OF CASE

A seventy-four-year-old man was admitted to the hospital in an unconscious state.

Two hours before admission the patient suddenly collapsed. He did not cry out or give any outward sign of pain. When his physician arrived the patient was deeply unconscious and rigid, with pin-point pupils and an absent right carotid pulse. He was immediately sent to the hospital.

Four years before admission he was at another hospital because of fluid in the right side of the chest. Pertinent findings at that time included a history of mild hypertension for two years, mild exertional dyspnea and slight ankle edema for three years and mild epigastric distress relieved by diet for many years; physical examination revealed a Grade 1 apical systolic murmur, a Grade 2 aortic systolic murmur, fluid in the right pleural cavity, a few moist rales in the right lung and a blood pressure of 168 systolic, 100 diastolic. An electrocardiogram showed left-ventricle strain; a roentgenogram of the chest demonstrated the right lower lung field to be obscured by fluid, the heart to be slightly increased in size, without any characteristic configuration, and the aorta to be calcified but not dilated. The patient improved on treatment with digitalis, Mercuhydrin and ammonium chloride and was discharged after two weeks. Two years before admission he had an undescribed episode, thought to be a cerebrovascular accident, from which he apparently made a complete recovery except for some residual weakness in the right leg. As far as was known, there had been no change in the state

of his health in the few days or hours prior to admission.

Physical examination showed a well nourished man whose skin was cold and clammy, with profuse sweating. He was comatose, responding only by slight nonpurposive movements to painful stimuli. Respirations were of the Cheyne–Stokes type. The neck veins were distended but did not pulsate. There were coarse rhonchi throughout the chest, which obscured the heart sounds. The cardiac rhythm was regular, and the rate 60, and there was a loud, rough systolic murmur heard best to the right of the sternum at the base and a distinct early diastolic murmur heard in the same location and transmitted down the left border of the sternum. Pulses were palpable and strong in the left carotid and both femoral arteries but were absent in the right carotid and in both radial, popliteal, posterior-tibial and dorsalis-pedis arteries. The abdomen was normal. There was ++ pitting edema of the ankles. The pupils were 1 mm. in diameter and did not react to light. The eyelids were lightly closed and winked occasionally; the eyes were in the mid-position, with occasional roving lateral conjugate movements. Corneal reflexes were present and equal. The face was symmetrical. The patient swallowed spontaneously several times. All four limbs were in rigid extension, with pronation of forearms, semiflexion of wrists and fingers and strong plantar flexion of feet. There was great resistance to passive movement of the left arm, most marked proximally, and of both legs; this was present in both flexor and extensor groups. The right arm was much less rigid than the left, but when the head was turned to the right, the right arm became strongly extended. Tendon reflexes were generally brisk and equal; abdominal and cremasteric reflexes were absent; plantar reflexes were extensor bilaterally.

The temperature was 102°F., the pulse 60, and the respirations 28. The blood pressure was unobtainable in either the arms or the legs.

Examination of the blood showed a hemoglobin of 15.5 gm. and a white-cell count of 15,500, with 90 per cent neutrophils. The urine gave a + reaction for albumin, and the sediment contained an occasional hyaline cast; the specific gravity could not be determined because of insufficient quantity. A lumbar puncture revealed clear spinal fluid with an initial pressure equivalent to 140 mm. of water. The spinal fluid contained 413 red cells and 2 white cells per cubic millimeter and 40 mg. of protein and 79 mg. of sugar per 100 cc.

The patient's condition remained unchanged, and he died quietly twenty hours after admission.

Differential Diagnosis

Dr. Charles S. Kubik*: This elderly man, who had had a moderate degree of hypertension, suddenly became unconscious and remained unresponsive throughout the hospital course. He was in a state of decerebrate rigidity. A question of anuria also comes up, but I cannot be sure about that. Was the patient catheterized? Was any urine obtained except for the specimen on admission?

Dr. Robert E. Scully: There was just one urine examination; no mention is made in the record of the urinary output during the hospital course. Can anyone give us any information about the urinary output?

Dr. Max Rukes: The patient was catheterized when he was in the Emergency Ward; a considerable quantity of urine was present, but I do not know whether it was formed before or after the episode that brought him to the hospital.

Dr. Kubik: The spinal reflexes — that is, the tendon reflexes — and also the plantar reflexes were present and there was some reflex activity from the brain stem. The patient swallowed — I suppose that it was reflex swallowing; the corneal reflexes were present, and there were some rolling movements of the eyes and occasional blinking. Thus, there were no obvious indications of a lower-motor-neuron paralysis at any level. Because the onset was so sudden, this must have been a vascular condition of some kind, and diagnosis and localization must be considered from a vascular as well as a neurologic point of view.

The character of the onset and the symptoms themselves, would, I believe, be consistent with infarction of the brain stem and perhaps of the hypothalamus and optic thalamus, resulting from an occlusion of the basilar artery. That would account for loss of consciousness, pin-point pupils, decerebrate rigidity and extensor plantar reflexes. Furthermore, pulsation was absent not only in the right carotid artery but also in the vessels of the extremities. That leads me to consider an occlusion in the innominate artery, blocking off the circulation in the brachial, vertebral and common carotid arteries, as the next explanation for the cerebral symptoms. That would not account for all the symptoms that this patient had. When the common carotid artery is occluded, as a rule the infarction is limited to the distribution of the middle cerebral artery because of the collateral circulation through the other internal carotid artery and anterior communicating artery. Occlusion of the vertebral artery may result in comparatively little disturbance, because of the collateral circulation through the opposite vertebral and the internal carotid arteries. In the case under discussion collateral circulation would have been restricted to the left internal carotid artery, which did pulsate. But this patient had pronounced atherosclerosis, calcification of the aorta and a cerebrovascular accident two years before admission — he may have had others — so that some of the arteries that would normally have provided a collateral supply of blood may have been occluded.

*Consultant in neuropathology (formerly, chief of neurology and neuropathologist), Massachusetts General Hospital.

There is also the possibility of anatomic variations, which are not at all uncommon. There may be only one vertebral artery or one normal-sized vessel and one very small one. The anterior communicating artery may be quite small and, when atherosclerotic, may be incompetent; sometimes, both anterior cerebral arteries arise from a single branch of one internal carotid artery.

Because of the small pupils, the sudden onset of pronounced coma and the decerebrate rigidity, I think that the circulatory disturbance must have involved the brain stem, whatever other pathologic process may have occurred. Extensive infarction in both cerebral hemispheres might result in decerebrate rigidity although I have never seen it. It does occur with cerebral hemorrhages and with severe head injury and was observed not long ago in a patient with anoxia resulting from an anesthesia accident.

What was the nature of the lesion? I believe one has to consider only three possibilities: thrombosis, embolism and dissecting aneurysm. Dissecting aneurysm has to be given serious consideration because of the absence of pulsation in the extremities, and yet it is hard to fit it in with the onset. Sudden loss of consciousness might take place if the dissection began near the origin of the innominate artery and immediately resulted in its occlusion, but I should have expected the onset to have been more gradual and to begin, as it usually does, with severe pain as the initial symptom. If there was anuria, that would tend to confirm the diagnosis, with dissection extending downward and blocking off the renal arteries. The circulation to the legs was not completely shut off because the ankle jerks were still present. In a number of patients with dissecting aneurysms without involvement of cerebral circulation, there has been complete motor and sensory paralysis in the legs because of the peripheral ischemia. Another thing suggestive of a dissecting aneurysm was the systolic aortic and early diastolic murmur to the left of the sternum although the systolic aortic murmur was present during the previous episode two or three years before entry.

Embolism would fit in best with the instantaneous loss of consciousness, but there was nothing suggestive of auricular fibrillation, myocardial infarction or any other source of emboli.

Can thrombosis be ruled out? There was marked atherosclerosis, and the onset of symptoms with thrombosis may be just as abrupt as with embolism; the thrombus may form gradually for a period and may not produce symptoms until the vessel suddenly becomes fully occluded.

I thought when I went over the case report the first time that the absence of pain and the immediate loss of consciousness probably ruled out a dissecting aneurysm, but other features of the case may outweigh that consideration, particularly if there was a suppression of urine. I shall put that down as the first choice, although I am not too well satisfied with it, and thrombosis as the second choice.

Dr. Rukes: Even though the patient had no urinary output, could you attribute that to a dissecting aneurysm? The patient was in shock, had no blood pressure in the arms or legs and probably had renal shutdown.

Dr. Kubik: If there was no urinary output, it would fit in with dissecting aneurysm. We have had a large number of dissecting aneurysms, many of which have been discussed in these conferences, and cerebral complications are not very common but do occur. I do not recall a single case in which pain was not the initial symptom and a very prominent one. The absence of pain and the sudden loss of consciousness would ordinarily rule out a dissecting aneurysm.

Dr. Laurence Barrows: Is that a prominent site for thrombosis?

Dr. Kubik: No; but I suppose it could occur there.

Clinical Diagnosis

Embolus to right carotid artery.

Dr. Charles S. Kubik's Diagnosis

Dissecting aneurysm of aorta, with occlusion of innominate artery.

Anatomical Diagnoses

Dissecting aneurysm of aorta and of innominate and right common carotid arteries, with occlusion of innominate artery and rupture into pericardial cavity.

Hemopericardium.

Cardiac hypertrophy, hypertensive type.

Cerebral arteriosclerosis.

Cerebral infarcts, old.

Nephrosclerosis.

Pathological Discussion

Dr. Scully: At post-mortem examination, the pericardial cavity contained 100 cc. of clotted blood. The adventitial surfaces of the great vessels within the pericardium were hemorrhagic, suggesting at once a leaking dissecting aneurysm. The aorta disclosed, 5 cm. above the aortic valve, a spiral intimal tear that almost encircled the vessel; the tear communicated with a hematoma in the wall that dissected downward to the level of the coronary orifices and upward into the arch along the entire extent of the innominate artery, and for

about 2.5 cm. into the right common carotid artery. A portion of the innominate artery was completely occluded (Fig. 1). The dissection did not extend into the arch beyond the origin of the innominate artery.

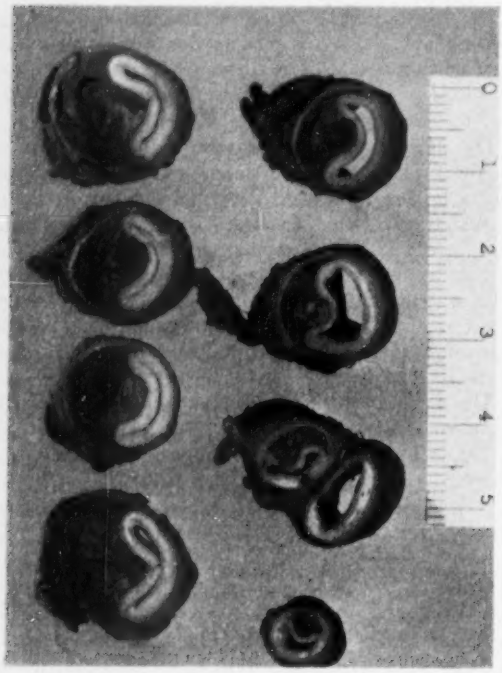

FIGURE 1. *Cross Sections of Innominate Artery and Its Branches, Showing Compression of the Lumen by the Hematoma, Dissecting in the Media of the Innominate and Common Carotid Arteries.*

Note the layer of media appearing as a light band external to the hematoma, indicating that dissection is in the media and not the adventitia.

Microscopically, the aorta and innominate artery showed the characteristic degenerative change of the media known as idiopathic cystic necrosis.

The heart was hypertrophied, weighing 550 gm.; it was a typical hypertensive heart. The kidneys showed moderate nephrosclerosis, and the lungs slight to moderate edema. The remainder of the disease was in the central nervous system, and Dr. Richardson will tell us about that.

DR. EDWARD P. RICHARDSON, JR.: The right common carotid artery above the point of occlusion by the dissection was patent, as was the right internal carotid artery. The left common and internal carotid arteries and both vertebral arteries were likewise found to be patent. The large arteries at the base of the brain contained many large atherosclerotic plaques, which greatly narrowed the lumen, but no total occlusion was found.

Examination of the brain disclosed a small cavity in the posterior limb of the internal capsule on the left side, entirely consistent with an old healed infarct. This lesion undoubtedly gave rise to the patient's residual weakness in the right leg. Since the patient survived only a few hours after the terminal episode, the other changes in the brain were less clearly visible. We did find small scattered areas of softening in the cerebral cortex bilaterally, and bilateral softening of the globus pallidus. Microscopical sections of such areas showed ischemic changes in the nerve cells, but no glial reaction. Much of the brain was of normal appearance. Undoubtedly, the impairment of function of both cerebral hemispheres was far greater than is demonstrable anatomically. We have evidence, as shown by the old lesion, that the circulation to the left cerebral hemisphere was already impaired. Apparently, the complete shutting off of the carotid blood supply on the right side was enough to produce ischemia of both cerebral hemispheres. No lesions were found in the brain stem and cerebellum.

Evaluation of Clinicopathological Conferences. To evaluate the place of the clinicopathological conference in medical education, Dr. Castleman would like to obtain a list of the groups that use the Massachusetts General Hospital Case Records as a teaching exercise in their society or hospital meetings, dinner clubs, student conferences and so forth. Replies indicating the method used in the group should be made directly to Dr. Castleman. Comments and suggestions will be welcome.

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REPORT ON GENERAL PRACTICE

An awakened interest in general practice and in the general practitioners has developed within recent years, not only in the personal survival of this hardy veteran in an era of specialization and of scientific medicine, but that he might survive for the benefit of mankind. In this country such steps for the rehabilitation of general practice as the establishment of a section in the American Medical Association and the founding of the Academy of General Practice had already been taken, long before the President's Commission on the Health Needs of the Nation was presumably more than a dream in the mind of its maker.

When the Commission began its deliberations a little over a year ago it soon became apparent that the role of the general practitioner was very close to the heart of the matter and that it was his function to satisfy in person many of the health needs of the nation. Such a concept was indicated in the Summary Report on General Practice that was made to the Commission and that has been paraphrased by its authors in their initial report, the first part of which appears in this issue of the *Journal*.

The primary health need of any nation as advanced as our own, according to the authors, is for a health-service instrument that will offer to the individual an intimate personal service to which he can turn for assistance and guidance in time of physical or mental distress, and a sound diagnostic and therapeutic service that will assure him a line of protection against the ordinary hazards of illness or injury. The general practitioner or family doctor is considered to be such an instrument.

The first part of the critique, presented herein, consists of an analysis of the types of general practice, considered according to both the training of the practitioner and the environmental conditions under which he must function, whether urban or rural and whether at more or less economically favorable levels. On such factors the quality of the service rendered depends.

The second part of the article, which will appear in next week's issue, attempts to define and describe what the general practitioner should be and should do, "better to serve his country and his kind." Although not mentioned specifically in this review, one of the most important recommendations of the original report is that actual field studies of the scope and quality of general practice should be conducted under the joint auspices of the various knowledgeable agencies. These are construed as being the Commission itself if it continues in existence, the American Medical Association, the Division of Public Health Practice of the United States Public Health Service, the American Academy of General Practice, the American College of Surgeons and the American Public Health Association. Such a study would really be "cooking with gas," as the young are wont to phrase it.

A word about the authors of the Summary Report and its present analysis is in order. Joseph S. Collings, a graduate of the University of Sydney Medical School, practiced as locum tenens in New

Zealand in 1946 and 1947. In 1948 he conducted studies of general practice in Manitoba for the provincial government and in the United States on a grant from the Rockefeller Foundation. He made a field study of general practice in England and Scotland in 1949 on a grant from the Nuffield Trust, then returned to the United States as a special research fellow of the National Institutes of Health, a consultant to the United States Public Health Service and, through 1950, a research fellow at the Harvard School of Public Health. In 1951 he engaged in group practice in New Zealand, returning to the United States as associate director of the Health Insurance Plan of New York, in charge of professional practices. It seems apparent that Dr. Collings, now in Italy, has been gathering no moss in the last seven years.

Dr. Clark, the senior author of the report and a surgeon and general practitioner of Peterborough, New Hampshire, is a graduate of the University of Vermont Medical School. He is lecturer on general practice at Boston University School of Medicine and a member of the Commission on the Health Needs of the Nation, representing general practice. He needs no further identification, for his name is already known wherever the highest standards of general practice are recognized and admired.

EDUCATION IN HEALTH

HEALTH education, as an organized effort at increasing the general awareness of those factors that contribute to personal and community health, has become almost overnight nearly a specialty in itself — or at least a very specialized auxiliary branch of all modern community health activities. So important is this division of public-health relations that for some months the Health Council of United Community Services has been concentrating attention on it through its Committee on Health Education

This study, however, has been directed rather to standardization of salaries than to the nature, organization or extension of the work involved. In proposing a salary scale for health education the committee has taken into consideration the salaries paid by the Massachusetts Department of Health for such professional workers, the cost-of-living index for the United States and for Massachusetts, and current teaching salaries in other lines of pedagogy in the area involved.

Any policy of magic and mystery in matters of health, as in those of sickness and its treatment, went out with the day, long past, when the legitimate practice of medicine rubbed elbows with charlatanry, and the patient was kept in an ignorance of the nature of his malady that was all too frequently shared by the physician who attended him. Today the general emphasis is on enlightenment, with an almost universal acceptance of the thesis that not only should the public be taken into the confidence of the agencies that have been developed to promote public and personal health, but active efforts should be made to create a mass of informed opinion on such matters. This policy has been endorsed by the American Medical Association as an important part of its community health program, and by the American Public Health Association through its Public Health Education Section.

Without giving special thought to it, the person with only a casual interest in the matter would hardly realize how many and varied the agencies are through which health education moves, its wonders to perform. In an area such as that served by United Community Services of Metropolitan Boston professional health educators are employed by the state and local departments of public health, as well as by many voluntary agencies at both levels, including the well known societies and associations for the study and control of such hazards to health as cancer, tuberculosis, heart disease and diabetes.

Definitively, community health education is stated by Patterson and Roberts* to be as follows:

> Community health education, as we see it today, is not just a sum of the unrelated activities carried on by each of the health workers serving independently in the community. In the modern sense, health education is the concerted effort of many people, professional workers and volunteers, coordinated and pointed toward influencing the entire community, through individual and family contact supplemented and extended by group and mass education.

*Patterson, R. S., and Roberts, B. J. *Community Health Education in Action.* 346 pp. St. Louis, Missouri: Mosby, 1951.

SPHINCTEROTOMY FOR CHRONIC RELAPSING PANCREATITIS?

ELSEWHERE in this issue of the *Journal* Major and Ottenheimer report on 23 cases of chronic relapsing pancreatitis. Their observations are similar to those of other workers in many respects. In the first place they have been impressed with the frequency with which this diagnosis may be made if one is alert to certain manifestations of pancreatic dysfunction. All 23 patients were seen within the short span of three years. The authors properly emphasize the value of a careful analysis of the character of the pain if the condition is to be recognized, and they stress the value of determinations of the serum amylase in establishing the diagnosis. Like others, they have had encouraging results after surgical division of the sphincter of Oddi.

Since the authors themselves point out the short period of follow-up study as a limitation of their findings, the validity of their conclusion that "transection of the sphincter is a rational, physiologic and effective method of treatment" remains unproved. It may be rational, but until more evidence of pathologic changes in or dysfunction of the sphincter of Oddi can be demonstrated, division of the sphincter cannot be regarded as physiologic and certainly cannot be regarded as effective therapy until more adequate follow-up data become available. Moreover, one must not overlook the experimental evidence that division of the sphincter of Oddi in the dog produces chronic infection in the gall bladder and liver.[1]

At present it is difficult to evaluate methods of therapy for chronic relapsing pancreatitis because it is not easy to define the disease as an entity. Extensive pancreatic calcification is occasionally revealed by x-ray examination in patients who have no symptoms of biliary or pancreatic disease. Transient elevations of the serum amylase in association with biliary colic, acute cholecystitis or common-duct stone are well known, but there is no evidence that a progressive pancreatic lesion occurs in the majority of patients who demonstrate this abnormality. When such a lesion develops the illness takes a fairly characteristic form that cannot be differentiated from cases of chronic relapsing pancreatitis without biliary-tract disease. This state is characterized by recurring bouts of abdominal pain, malnutrition variable in degree and evidence of varying pancreatic insufficiency as manifested by steatorrhea.

The treatment of chronic relapsing pancreatitis, once evidence of pancreatic insufficiency has appeared, has not been uniformly successful. When the disease is associated with infection and calculi in the biliary tract, a considerable number of patients are greatly improved by cholecystectomy and choledochostomy whether or not sphincterotomy is included in the procedure.[2] Roughly, half the cases, however, continue with a progressive course, and the difficulty in management is indicated by the variety of procedures being employed to check the course of this disease. Splanchnicectomy for relief of pain, vagotomy for its effect in diminishing gastric and pancreatic secretions, sphincterotomy to ensure patency of the sphincter of Oddi and transplantation of the common bile duct into the stomach or small intestine have all been tried with varying success. Each method has its advocates, but the results have not warranted universal adoption of any single procedure.

The role of excessive alcoholism appears to be an important one in many cases of chronic relapsing pancreatitis. Its association with the precipitation of acute and subacute attacks is well known, and in all cases, whether or not there is a history of excessive indulgence, its rigid elimination seems to be an important therapeutic measure.

The report of Major and Ottenheimer is a valuable link in the development of knowledge of chronic pancreatitis. It remains to be seen whether the judicious employment of sphincterotomy in connection with biliary surgery will prevent the development of chronic progressive pancreatitis or will have a permanently favorable effect on the course of the disease when correction of the abnormalities of the biliary tract has failed to do so. A longer follow-up period of their cases will be awaited with interest. Meanwhile, the role of sphincterotomy per se in the treatment of chronic relapsing pancreatitis merits continued study rather than universal adoption.

REFERENCES

1. Gray, S. H. Probstein, J. G., and Sachor, L. A. Chronic cholecystitis produced by division of sphincter of Oddi. *Arch. Surg.*, **59**:1007-1014, 1949.
2. Gambill, E. E., Comfort, M. W., and Baggenstoss, A. H. Chronic relapsing pancreatitis: analysis of 27 cases associated with disease of biliary tract. *Gastroenterology* **11**:1-33, 1948.

HUNTERIAN SOCIETY DEBATES

THE Hunterian Society, according to the *British Medical Journal* of November 29, 1952, debated at Apothecaries' Hall on November 17 another challenging proposition. This was "that the continued advance in medicine will produce more problems than it solves." The discussion was reported as delightfully discursive but seemed hardly to get down to the real issue.

Dr. Ffrangcon Roberts, the Cambridge radiologist and economist, in arguing for the proposition pointed out that "even in the mental sphere medical statisticians were arising who tested our intellectual honesty, and they were followed by a breed of psychiatrists who inquired into the mental processes of the statisticians to see whether they were sound or not, and these again by other statisticians, who inquired into the conclusions of the psychiatrists, and so *ad infinitum*."

Mr. Ritchie Calder, speaking also for the affirmative, noted that in underdeveloped countries where malaria and other diseases had been controlled "Population had increased, life was lengthened, disease eradicated, but these results brought new types of social and educational problems to baffle the resources of the administration."

The negative was opened by Mr. James Griffiths, M. P., former Colonial Secretary in the Labor Government, who presented quite simply a unique answer to his opponents: "You go on creating your problems: we (the politicians) will solve them."

Professor L. P. Garrod, although expressing some amazement at finding himself on the same side as a Labor ex-Minister, nevertheless argued against the proposition. In the general discussion that followed Mr. Dickson Wright spoke to the effect "that never was it more difficult than now (owing to birth control) to get oneself conceived, but, that obstacle overcome, never was it more easy to become a member of the human race, nor more difficult to leave it."

Much clean fun was had, and the proposition was carried by 59 votes to 47.

Dr. Mattson is said to be reaping a profitable harvest from his new and much approved syringe. It is worth half a dozen circles of tolerably profitable practice. "There is a tide in the affairs of men," and this is one of them.

Boston M. & S. J., *January 26, 1853*

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

CONSULTATION CLINICS FOR CRIPPLED CHILDREN IN MASSACHUSETTS

The February schedule of the Consultation Clinics for Crippled Children in Massachusetts is as follows:

ORTHOPEDIC CLINIC	DATE	CLINIC CONSULTANT
Salem	February 2	Paul W. Hugenberger, M.D.
Gardner	February 3	Carter R. Rowe, M.D.
Haverhill	February 4	William T. Green, M.D.
Greenfield	February 5	Charles L. Sturdevant, M.D.
Lynn*	February 9	Daniel M. Killoran, M.D., and John J. Crowley, M.D.
Brockton	February 12	George W. Van Gorder, M.D.
Lowell	February 13	Albert H. Brewster, M.D.
Worcester	February 13	John W. O'Meara, M.D.
Fall River	February 16	David S. Grice, M.D.
Springfield	February 17	James D. Fisher, M.D.
Pittsfield	February 18	Edward J. Coughlin, Jr., M.D.
Hyannis	February 26	Paul L. Norton, M.D.

RHEUMATIC-FEVER CLINIC	DATES
North Reading	February 3, 10, 17, 24
Fitchburg	February 4, 11, 18, 25

PLASTIC CLINIC	HELD	CONSULTANT
Eastern Massachusetts	Semi-monthly	Bradford Cannon, M.D.
Western Massachusetts	Monthly	Joseph M. Baker, M.D.

Physicians referring new patients to clinic should get in touch with the district health officer to make appointments. Patients are seen by appointment only.

*This clinic serves Lynn, Lynnfield, Saugus, Nahant, Revere, Chelsea, Everett and Winthrop. Referrals should be made directly to the Lynn Hospital.

COMMUNICABLE DISEASES IN MASSACHUSETTS FOR DECEMBER, 1952

RÉSUMÉ

DISEASE	DECEMBER 1952	DECEMBER 1951	SEVEN-YEAR MEDIAN
Chancroid	1	4	2
Chicken pox	3203	990	1450
Diphtheria	2	3	21
Dog bite	725	588	616
Dysentery, bacillary	7	0	4
German measles	103	210	64
Gonorrhea	149	162	257
Granuloma inguinale	0	0	0
Lymphogranuloma venereum	1	0	0
Malaria	1	1	1
Measles	81	2685	702
Meningitis, meningococcal	8	9	9
Meningitis, Pfeiffer bacillus	4	11	8
Meningitis, pneumococcal	2	2	3
Meningitis, staphylococcal	0	0	0
Meningitis, streptococcal	0	0	0
Meningitis, undetermined	8	6	4
Mumps	773	1313	847
Poliomyelitis	24	9	11
Salmonellosis	29	4	4
Scarlet fever	431	228	475
Syphilis	104	316	238
Tuberculosis, pulmonary	156	137	207
Tuberculosis, other forms	9	6	12
Typhoid fever	1	1	2
Undulant fever	2	2	2
Whooping cough	150	249	448

COMMENT

Diseases below the seven-year median included diphtheria, measles, mumps, scarlet fever and whooping cough.

After five consecutive months in which no cases of diphtheria were reported, 2 cases were reported in December. This figure, however, falls considerably short of the seven-year median of 21 cases for the month.

The 81 cases of measles make this a figure, by far the lowest ever reported for December in the history of this state, and is even more striking when compared with the 2685 cases reported for December, 1951.

The 150 cases of whooping cough reported represent the lowest figure ever reported for December.

Diseases above the seven-year median were chicken pox, bacillary dysentery, poliomyelitis and salmonellosis.

The 3203 cases of chicken pox reported for December establish a record for this month in the history of this state.

Reported cases of poliomyelitis and salmonellosis showed an increase over the preceding month, salmonellosis establishing a new high for the month of December.

Geographical Distribution of Certain Diseases

The following diseases were reported from the communities named:

Diphtheria: Littleton, 1; Medford, 1; total, 2.

Dysentery, bacillary: Boston, 1; Chelsea, 2; Grafton, 1; Waltham, 1; Worcester, 2; total, 7.

Encephalitis, infectious: Leominster, 1.

Hepatitis, infectious: Arlington, 1; Auburn, 1; Boston, 8; Bourne, 2; Chicopee, 1; Danvers, 1; Dartmouth, 4; Fort Devens, 3; Holden, 3; Leicester, 4; Lynn, 1; Marlboro, 2; Millbury, 29; New Bedford, 1; North Adams, 1; Quincy, 2; Shrewsbury, 2; Spencer, 1; Winthrop, 1; Worcester, 76; total, 144.

Lymphocytic choriomeningitis: Medford, 1.

Malaria: Forth Devens, 1.

Meningitis, meningococcal: Boston, 1; Lawrence, 1; Marshfield, 1; Springfield, 1; Woburn, 1; Worcester, 3; total, 8.

Meningitis, mumps: Newton, 1.

Meningitis, Pfeiffer bacillus: Medway, 1; Scituate, 1; Springfield, 1; Uxbridge, 1; total, 4.

Meningitis, pneumococcal: Lawrence, 1; Orange, 1; total, 2.

Meningitis, undetermined: Acton, 1; Cambridge, 1; Haverhill, 1; Pittsfield, 2; Salem, 1; Wenham, 1; Worcester, 1; total, 8.

Poliomyelitis: Ashfield, 1; Barre, 1; Boston, 1; Brockton, 1; Cambridge, 3; Holyoke, 1; Lexington, 1; Littleton, 1; Medford, 1; Newton, 2; Northfield, 2; Orange, 1; Oxford, 1; Princeton, 1; Saugus, 1; Somerville, 1; Springfield, 1; Taunton, 1; Westport, 1; Worcester, 1; total, 24.

Salmonellosis: Athol, 1; Belmont, 1; Beverly, 1; Boston, 5; Cambridge, 1; Fitchburg, 1; Hingham, 2; Ipswich, 1; Malden, 2; Medfield, 1; Needham, 2; Newton, 2; Northboro, 1; Paxton, 1; Rowley, 1; Salem, 1; Somerville, 1; Sharon, 1; Wellesley, 1; Weymouth, 1; total, 29.

Septic sore throat: Cambridge, 1; Marblehead, 3; Worcester, 1; total, 5.

Trichinosis: New Bedford, 1; Swampscott, 1; total, 2.

Typhoid fever: Brockton, 1.

Undulant fever: Revere, 1; Somerville, 1; total, 2.

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

S. Weir Mitchell as a Psychiatric Novelist. By David M. Rein. With a preface by C. P. Oberndorf. 8°, cloth, 207 pp. New York: International Universities Press, Incorporated, 1952. $3.50.

Professor Rein discusses the various mentally disturbed persons appearing in the novels and stories of Dr. Mitchell, who was an eminent neurologist. There are a number of chapters relating to Mitchell's background in Philadelphia and his early work in neurology. It is pointed out that the persons portrayed are not the main characters in a book or story, but are secondary personages interjected into the story. It is noted that this is quite different from the plan used by Dr. Oliver Wendell Holmes in his three novels portraying psychiatric personalities, who were treated as the principal characters in the novels. The studies are divided into five categories: deterioration of character; couch-loving invalids; dual personality; dipsomania; and insanity. A final chapter deals with Mitchell as a novelist, in which his work is analyzed and compared with that of Dr. Holmes.

The Human Blood Groups Utilized in Disputed Paternity Cases and Criminal Proceedings. By P. H. Andresen, M.D., chief, Municipal Blood Bank, Bispebjerg Hospital. 8°, cloth, 115 pp., with 22 tables. Springfield, Illinois: Charles C Thomas, 1952. $3.75.

This small book deals with the medicolegal aspects of blood groups, especially in disputed paternity cases. The various blood groups are discussed in relation to their properties, heredity and their evaluation in general and the reliability of determination, each group being considered separately.

Allergic Pruritus: Its dermatologic management. Stephan Epstein, M.D., editor. 12°, cloth, 76 pp. Saint Paul: Bruce Publishing Company, 1952. $2.50. (Official publication of the American College of Allergists, Incorporated.)

The articles in this volume were read at a "symposium on itching dermatoses," held in connection with a meeting of the American College of Allergists in St. Louis in 1950. Nine specialists discussed the subject in its varying aspects, including physiology, pharmacology, diagnosis, classification, local and systemic treatment and the role of focal infection, especially in eczema and pruritus.

How I Cured My Ulcer. By John Parr. 12°, cloth, 155 pp. Boston: Little, Brown and Company, 1952. $2.75.

This small book is essentially the autobiography of a sufferer from duodenal ulcer, who after twenty years was apparently cured by the Spira diet and has remained well for five years. This diet, which is in direct opposition to the Sippy diet, is explained in detail.

The Clinically Important Reflexes. By Dr. Med. Friedrich W. Bronisch, instructor, University of Heidelberg, and research assistant, Psychiatric and Neurologic Clinic, University of Heidelberg. First American edition, revised and enlarged by Clemens E. Benda, M.D., Boston. 16°, cloth, 88 pp., with 49 illustrations. New York: Grune and Stratton, 1952. $4.75.

This manual presents a summary of the reflexes used in neurologic examination. The subject is first discussed in general, followed by descriptions of the various reflexes, arranged by regions of the body and illustrated with diagrammatic sketches.

Spatial Vectorcardiography. By Arthur Grishman, M.D., adjunct physician for cardiology, Mount Sinai Hospital, New York City, and adjunct physician in medicine and assistant roentgenologist, Beth Israel Hospital, New York City; and Leonard Scherlis, M.D., research assistant in cardiology, Mount Sinai Hospital, New York City. 4°, cloth, 217 pp., with illustrations. Philadelphia: W. B. Saunders Company, 1952. $6.00.

This monograph presents the work of the authors carried on at Mount Sinai Hospital, New York City, beginning with 1948. The preliminary chapters discuss electrocardiography in general, the cardiac vector in its various aspects and the technic of derivation. Special chapters are devoted to hypertrophy of the left ventricle and left-bundle-branch block, hypertrophy of the right ventricle, right-bundle-branch block and myocardial infarction. The monograph is issued in an inexpensive format. There is a bibliography of 179 titles and a good index, and the volume is well illustrated.

Cowdry's Problems of Ageing: Biological and medical aspects. Edited by Albert I. Lansing, Ph.D., Washington University, St. Louis. Third edition. 8°, cloth, 1061 pp., with illustrations. Baltimore: Williams and Wilkins Company, 1952. $15.00.

This authoritative reference work, first issued in 1939, has been thoroughly revised to include the new literature on gerontology published since the previous edition of 1942. It is the joint effort of forty-seven contributors, all specialists in their particular fields. Lists of selected references are appended to the various chapters; there is a good index, and the publishing is excellent. The book is recommended for all medical libraries.

Trauma, Growth, and Personality. By Phyllis Greenacre, M.D., professor of clinical psychiatry, Cornell University Medical College. 8°, cloth, 328 pp. New York: W. W. Norton and Company, Incorporated, 1952. $4.50.

This book contains a number of psychoanalytic studies originally published in periodicals and brought together in one volume to make them more easily accessible. They discuss psychic trauma and its consequent effects upon personality.

Outline of Fundamental Pharmacology: The mechanics of the interaction of chemicals and living things. By David F. Marsh, professor and head, Department of Pharmacology, West Virginia University School of Medicine. 8°, cloth, 219 pp., with 18 illustrations. Springfield, Illinois: Charles C Thomas, 1951. $6.00.

The fundamentals of pharmacology are discussed in this manual. The subject is divided into six parts, dealing with the dose-effect relation, location of site of action, absorption and distribution, fate of drugs, mechanism of action and chemical constitution and biologic action. Lists of references are appended to the various chapters, and there is a good index. The book should be in all collections on pharmacology and therapeutics.

NOTICES

SOUTH END MEDICAL CLUB

The South End Medical Club will hold its monthly luncheon meeting at the Headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston, on Tuesday, February 17, at 12 noon. William B. Schwartz, M.D., assistant professor of medicine, Tufts College Medical School, and assistant physician, New England Center Hospital, will speak on the subject "The Use and Interpretation of Renal Function Tests."

All physicians are cordially invited to attend.

SPRINGFIELD ACADEMY OF MEDICINE

A regular meeting of the Springfield Academy of Medicine will be held on Tuesday, February 10. Jacob H. Swartz, M.D., assistant professor of dermatology, Harvard Medical School, and consulting dermatologist, Massachusetts General Hospital, will speak on the subject "Dermatology in Office Practice."

SPRINGFIELD HOSPITAL EDUCATIONAL PROGRAM

The Educational Program of the Springfield Hospital for the month of February is as follows:

Monday, February 2
6:30 p.m. Colonic Lesions. Staff Conference Room. Dr. Robert A. Grugan.

Friday, February 6
11 a.m.–12 m. Grand Medical Rounds, Staff Conference Room.
6:30 p.m. Vaginal Bleeding Due to Functional Disturbances and Treatment. Staff Conference Room. Dr. Robert J. Carpenter, Jr.

Saturday, February 7
8:30–10 a.m. Surgical Service Conference, classroom, second floor.
10–11 a.m. Grand Surgical Rounds, Staff Conference Room.
11 a.m.–12 m. Combined Medical-Surgical Grand Rounds, Staff Conference Room.

Monday, February 9
6:30 p.m. Evaluation of Different Tests in Peripheral Vascular Diseases. Staff Conference Room. Dr. Field C. Leonard.

Friday, February 13
11 a.m.–12 m. Grand Medical Rounds, Staff Conference Room.
6:30 p.m. Portal Hypertension and Treatment. Staff Conference Room. Dr. Omar T. Pace.

Saturday, February 14
8:30–10:00 a.m. Surgical Service Conference, classroom, second floor.
10–11 a.m. Grand Surgical Rounds, Staff Conference Room.
11 a.m.–12 m. Clinicopathological Conference, Staff Conference Room.

Monday, February 16
6:30 p.m. Blood Transfusions and Plasma Expanders. Staff Conference Room. Dr. Carroll Bryant.

Friday, February 20
11 a.m.–12 m. Grand Medical Rounds, Staff Conference Room.
6:30 p.m. The Spleen in Health and Disease. Staff Conference Room. Drs. William Kaufmann and Ahmad Nakib.

Saturday, February 21
8:30–10:00 a.m. Surgical Service Conference, classroom, second floor.
10–11 a.m. Grand Surgical Rounds, Staff Conference Room.
11 a.m.–12 m. Medical-Death Review, Staff Conference Room.

Monday, February 23
6:30 p.m. Colostomies. Staff Conference Room. Dr. Omar T. Pace.

Friday, February 27
11 a.m.–12 m. Grand Medical Rounds, Staff Conference Room.
6:30 p.m. Proper Use of Hormones in Gynecological Conditions. Staff Conference Room. Dr. Robert J. Carpenter, Jr.

Saturday, February 28
8:30–10:00 a.m. Surgical Service Conference, classroom, second floor.
10–11 a.m. Grand Surgical Rounds, Staff Conference Room.
11 a.m.–12 m. Surgical-Death Review, Staff Conference Room.

Every Wednesday, from 11 a.m. to 12 m., a psychosomatic and group-psychotherapy conference is held in the Staff Room under the direction of Dr. Calvert Stein. Every Thursday, from 3 to 4 p.m., a pathology conference is held in the Staff Conference Room.

AWARD FOR OUTSTANDING RESEARCH IN THE FIELD OF INFERTILITY

The American Society for the Study of Sterility announces the opening of the 1953 contest for the outstanding contribution to the subject of infertility and sterility. The winner will receive a cash award of $1,000, and the essay will appear on the program of the 1953 meeting of the Society. Essays submitted in this competition must be received not later than March 1, 1953. Full particulars concerning requirements of this competition may be obtained from the American Society for the Study of Sterility (c/o Dr. Herbert H. Thomas), 920 South 19th Street, Birmingham, Alabama.

The author should append on a separate sheet of paper a short biographical sketch of himself and include a photograph to be used in the necessary publicity should he be the winner of the award.

SOCIETY MEETINGS AND CONFERENCES

JANUARY 23–30. Combined Anesthesia Teaching Conferences of Boston. Page 785, issue of November 13.

JANUARY 23–31. Springfield Hospital Educational Program. Page 1000, issue of December 18.

JANUARY 26–MARCH 23. Postgraduate Course in General Medicine. Cushing Veterans Administration Hospital, Framingham. Page 697, issue of October 30.

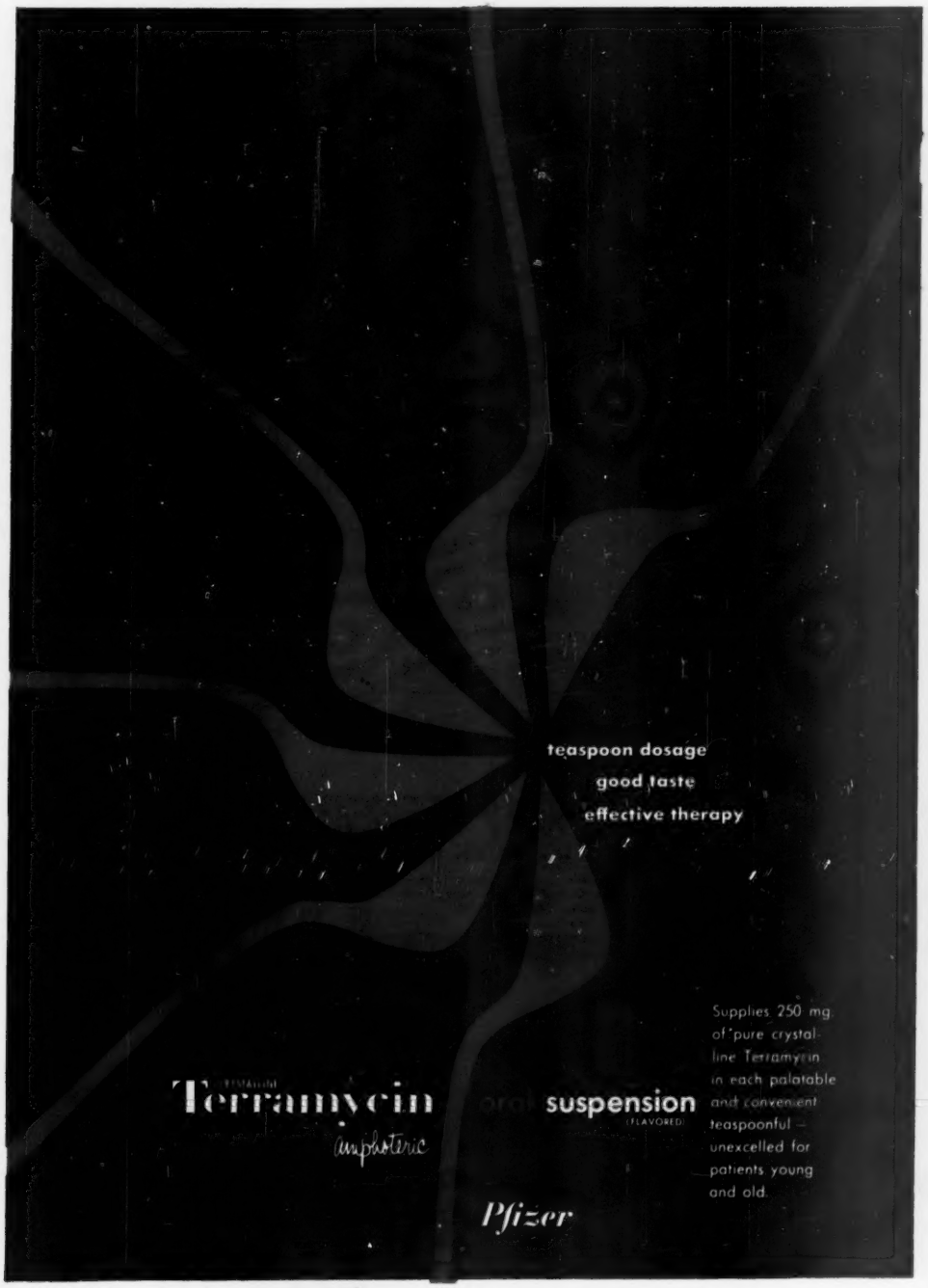
JANUARY 28. Lahey Clinic Lectures. Page 1050, issue of December 25.

JANUARY 28. Boston Gastroenterological Society. Page 123, issue of January 15.

JANUARY 28. Boston Graduate Club of Phi Delta Epsilon Medical Fraternity. Boston Club, 46 Beacon Street, Boston. *Please note change of date.*

JANUARY 28–APRIL 1. Postgraduate Medical Institute Course in General Medicine. Burbank Hospital, Fitchburg. Page 1049, issue of December 25.

(*Notices concluded on page xi*)



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NOTICES (*Concluded from page 164*)

JANUARY 28–April 8. Postgraduate Medical Institute. Boston. Page 452, issue of September 18.

JANUARY 30. First Public Health Workshop on Dental Care in Industry. Page 41, issue of January 1.

JANUARY 30 AND FEBRUARY 20. New England Center Hospital House Officers' Association. Page 124, issue of January 15.

FEBRUARY 2–28. Springfield Hospital Educational Program. Page 164.

FEBRUARY 2–APRIL 20. Hartford Medical Society. Page 42, issue of January 1.

FEBRUARY 3. Tufts Medical Alumni Lecture. Page 124, issue of January 15.

FEBRUARY 6. New England Society of Anesthesiologists. Page 827, issue of November 20.

FEBRUARY 6. American College of Radiology. Page 1001, issue of December 18.

FEBRUARY 7. Treatment of Coronary-Artery Disease: Present Status of Anticoagulants and Early Ambulation. Drs. Paul D. White and Samuel A. Levine. Mount Auburn Hospital, Cambridge.

FEBRUARY 9 AND 10. Annual Congress on Medical Education and Licensure. Page 786, issue of November 13.

FEBRUARY 10. Springfield Academy of Medicine. Page 164.

FEBRUARY 17. South End Medical Club. Page 164.

FEBRUARY 23 AND 24. American College of Surgeons. Page 42, issue of January 1.

MARCH 2–5. New Orleans Graduate Medical Assembly. Page 828, issue of November 20.

MARCH 2–MAY 4. Massachusetts Department of Mental Health. Postgraduate Seminar in Neurology and Psychiatry. Page 540, issue of October 2.

APRIL 3. New England Society of Anesthesiologists. Page 418, issue of September 11.

APRIL 29 AND OCTOBER 28. New England Obstetrical and Gynecological Society. Page 868, issue of November 27.

MAY 19–21. Massachusetts Medical Society. Hotel Statler, Boston.

MAY 25–31. First World Congress on Fertility and Sterility. Page 1001, issue of December 18.

DISTRICT MEDICAL SOCIETIES

ESSEX NORTH

MAY 13. Andover Country Club, Shawsheen.

MIDDLESEX WEST

JANUARY 26–MARCH 23. Postgraduate Course in General Medicine. Cushing Veterans Administration Hospital, Framingham.

NORFOLK

JANUARY 27.
FEBRUARY 24.
MARCH 24.

CALENDAR FOR BOSTON DISTRICT FOR THE WEEK BEGINNING THURSDAY, JANUARY 29

THURSDAY, JANUARY 29

*8:30–10:00 a.m. Orthopedic Staff Conference. Boston City Hospital.
*9:00–10:00 a.m. Arthritis Grand Rounds. Robert Breck Brigham Hospital.
*11:00 a.m.–12:30 p.m. Hand Clinic (Physical Medicine and Rehabilitation Service). Boston City Hospital.
12:00 m. Consultation Rounds. Psychiatry. Cardiovascular. Boston City Hospital.
*12:00 m.–1:00 p.m. Aids in the Diagnosis of Benign and Malignant Ulceration of the Stomach. Dr. Emmanuel Deutsch. Stearns Auditorium, New England Center Hospital.
*5:00–6:00 p.m. Surgical Division Meeting. Mount Auburn Hospital, Cambridge.

FRIDAY, JANUARY 30

*10:00 a.m. Tuberculosis Surgical Clinic. South End Health Unit, 57 East Concord Street.
*10:00 a.m.–1:00 p.m. Medical and Surgical Grand Rounds. Dr. George W. Thorn and Dr. Francis D. Moore. Main Amphitheater, Peter Bent Brigham Hospital.
10:30–11:15 a.m. Diabetes Lecture. Dr. Elliott Joslin. New England Deaconess Hospital.
*10:30 a.m.–1:30 p.m. Combined Medical and Surgical Rounds. Stearns Auditorium, New England Center Hospital.
11:00 a.m.–12:00 m. Pediatric Conference. Mount Auburn Hospital, Cambridge.
*1:30 p.m. Fertility and Endocrine Clinic. Free Hospital for Women, Brookline.
*1:30 p.m. Tumor Clinic. Mount Auburn Hospital, Cambridge.
*4:00–10:00 p.m. Alcoholism Clinic. By appointment. Washingtonian Hospital, 41 Waltham Street.
*7:00 p.m. Some Aspects of Acid Base Regulation. Dr. Robert F. Pitts. New England Center Hospital House Officers' Association. Stearns Auditorium, New England Center Hospital.
*7:00–9:00 p.m. Combined Anesthesia Teaching Conferences of Boston. Amphitheater, Evans Memorial, Massachusetts Memorial Hospitals, Eighth Floor, 65 East Newton Street.

SATURDAY, JANUARY 31

*9:00 a.m. Proctology Clinic. Peter Bent Brigham Hospital.
*9:00 a.m. Alcoholism Clinic. Peter Bent Brigham Hospital.
*11:00 a.m.–12:00 m. Blood Clinic. Dr. William Dameshek. Stearns Auditorium, New England Center Hospital.
12:00 m. Pathology Rounds. Mallory Amphitheater, Boston City Hospital.

MONDAY, FEBRUARY 2

*8:00–9:00 a.m. Combined Medical and Surgical Rounds for Diabetic Surgery Cases. New England Deaconess Hospital.
*8:30–9:30 a.m. Clinic by entire Surgical Staff and Anesthesia Staff. Cheever Amphitheater, Dowling Building, Boston City Hospital.
12:00 m. Clinicopathological Conference (Boston Floating Hospital). Pratt Lecture Hall, Joseph H. Pratt Diagnostic Hospital.
*12:15–1:15 p.m. Clinicopathological Conference. Main Amphitheater, Peter Bent Brigham Hospital.
*7:00–9:00 p.m. Anesthesia Teaching Conference. Stearns Auditorium, New England Center Hospital.

TUESDAY, FEBRUARY 3

*9:00 a.m. Geriatrics Clinic. Peter Bent Brigham Hospital.
*12:00–1:00 p.m. Pediatric Rounds. Burnham Memorial Hospital for Children, Massachusetts General Hospital.
*12:15–1:15 p.m. X-ray Conference. Dr. Merrill Sosman. Main Amphitheater, Peter Bent Brigham Hospital.
*5:00–6:00 p.m. Service Meeting followed by Clinical Conference (Medical, Surgical, Obstetrical). Faulkner Hospital.

WEDNESDAY, FEBRUARY 4

*12:00 m. Boston State Hospital Psychiatric Seminar. Reception Building Auditorium, 591 Morton Street, Dorchester.
*12:00 m.–1:00 p.m. Clinicopathological Conference. (Children's Medical Center.) Jimmy Fund Building, 25 Binney Street.
12:30 p.m. Weekly Pathological Meeting. Joslin Amphitheater, New England Deaconess Hospital.
*4:00 p.m. Thoracic Conference. Held by Overholt Clinic. Harris Hall, New England Deaconess Hospital.
*4:00–5:30 p.m. Fracture Lecture. Boston City Hospital.

*Open to the medical profession.

Index to Advertisers

	PAGE
ABC Pregnancy Tests Laboratory	vi
American Hospital Supply Corp.	iii
Ar-Ex Cosmetics, Inc.	x
Baldpate, Inc.	x
Baxter Laboratories, Inc.	iii
Crane Discount Corporation	iv
David Memorial Nursing Home	x
Davies, Rose & Co., Ltd.	vii
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Glenside, Inc.	x
Hanover House, Inc.	x
Hoffmann–La Roche, Inc.	ii
Knox Gelatine Company, Inc.	iv
Leary Laboratory	vi
Eli Lilly and Company	viii
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Charles Pfizer & Co., Inc.	ix
Ring Sanatorium	x
W. B. Saunders Company	Front Cover
Sky View Terrace	iv
Southern Medical Supply Co.	iv
Storrow House (Massachusetts General Hospital)	vi
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Washingtonian Hospital	iv
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